SECTION 142400
HYDRAULIC ELEVATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Complete hydraulic elevator systems.

1. Passenger type.

a. Standard pre-engineered hydraulic passenger elevators.

b. Elevator car enclosures, hoistway entrances and signal equipment.

c. Jack(s).

d. Operation and control systems.

e. Accessibility provisions for physically disabled persons.

f. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.

g. Materials and accessories as required to complete the elevator installation.

B. Elevator Maintenance Contract.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Includes elevator machine foundation and elevator pit.

B. Section 042000 - Unit Masonry: Masonry hoistway enclosure; building-in hoistway door frames.

C. Section 051200 - Structural Steel Framing: Includes hoistway framing and overhead hoist beams.

D. Section 055000 - Metal Fabrications: Includes elevator pit ladder and sill supports.

E. Section 078400 - Firestopping: Fire rated sealant in hoistway.

F. Section 083100 - Access Doors and Panels: Fire rated access doors into hoistway.

G. Section 096500 - Resilient Flooring: Floor finish in car.

H. Section 211300 - Fire-Suppression Sprinkler Systems: Sprinkler heads in hoistway.

I. Section 223000 - Plumbing Equipment: Pit drain.

J. Section 260533.13 - Conduit for Electrical Systems:

K. Section 260583 - Wiring Connections:

L. Section 284600 - Fire Detection and Alarm:

1. Fire and smoke detectors and interconnecting devices.

2. Fire alarm signal lines to elevator controller cabinet.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

C. ASME A17.1 - Safety Code for Elevators and Escalators 2019.

D. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks 2017.

E. ASME QEI-1 - Standard for the Qualification of Elevator Inspectors 2018.

F. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

H. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2014.

J. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2013.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel 2015, with Errata (2016).

L. ITS (DIR) - Directory of Listed Products current edition.

M. NEMA LD 3 - High-Pressure Decorative Laminates 2005.

N. NEMA MG 1 - Motors and Generators 2018.

O. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

P. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Q. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2019.

R. PS 1 - Structural Plywood 2009.

S. UL (DIR) - Online Certifications Directory Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate work with other installers to provide conduits necessary for installation of wiring including but not limited to:

a. Elevator equipment devices remote from elevator machine room or hoistway.

b. Remote group automatic panel in lobby from controller cabinet.

c. Telephone service for machine room.

d. Elevator pit for lighting and sump pump.

e. Automatic transfer switch from controller cabinet.

2. Coordinate work with other installers for equipment provisions necessary for proper elevator operation, including but not limited to, the following:

a. Automatic transfer switches with auxiliary contacts for emergency power transfer status indication.

b. Shunt trip devices for automatic disconnection of elevator power prior to fire suppression system activation.

c. Overcurrent protection devices selected to achieve required selective coordination.

B. Preinstallation Meeting: Convene meeting at least one week prior to start of this work.

1. Review schedule of installation, proper procedures and conditions, and coordination with related work.

C. Construction Use of Elevator: Not permitted.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on following items:

1. Signal and operating fixtures, operating panels, and indicators.

2. Car design, dimensions, layout, and components.

3. Car and hoistway door and frame details.

4. Electrical characteristics and connection requirements.

C. Shop Drawings: Include appropriate plans, elevations, sections, diagrams, and details on following items:

1. Elevator Equipment and Machines: Size and location of driving machines, power units, controllers, governors, and other components.

2. Hoistway Components: Size and location of car guide rails, buffers, jack unit and other components.

3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.

4. Clearances and over-travel of car.

5. Locations in hoistway and machine room of traveling cables and connections for car lighting and telephone.

6. Location and sizes of hoistway and car doors and frames.

7. Electrical characteristics and connection requirements.

8. Indicate arrangement of elevator equipment and allow for clear passage of equipment through access openings.

D. Samples: Submit samples illustrating car interior finishes, car and hoistway door and frame finishes, and handrail material and finish in the form of cut sheets and material samples.

E. Manufacturer's Qualification Statement.

F. Testing Agency's Qualification Statement.

G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

H. Initial Maintenance Contract.

I. Maintenance Contract: Submit proposal to Owner for standard one year continuing maintenance contract agreement in accordance with ASME A17.1 and requirements as indicated, starting on date initial maintenance contract is scheduled to expire.

1. Indicate in proposal the services, obligations, conditions, and terms for agreement period and for renewal options.

J. Operation and Maintenance Data:

1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.

2. Operation and maintenance manual.

3. Schematic drawings of equipment and hydraulic piping, and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on machine room and hoistway apparatus.

1.06 QUALITY ASSURANCE

A. Maintain one copy of each quality standard document on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and approved by elevator equipment manufacturer.

D. Inspection and testing: Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.

1. Arrange for inspections and make required tests.

2. Deliver to the Owner upon completion and acceptance of elevator work.

E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.

F. Products Requiring Fire Resistance Rating: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.

G. Products Requiring Electrical Connection: Listed and classified by UL (DIR) or testing agency acceptable to authorities having jurisdiction as suitable for the purpose indicated in construction documents.

1.07 PROJECT CONDITIONS

A. Prohibited Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.

1.08 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's warranty for elevator operating equipment and devices for one year from Date of Substantial Completion.

1.09 MAINTENANCE

A. Furnish maintenance and call back service for a period of 12 months for each elevator after Date of Substantial Completion, during normal working hours, excluding callbacks. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation.

1. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design - Hydraulic Elevators: ThyssenKrupp Elevator; Endura MRL 3500.

B. Other Acceptable Manufacturers - Hydraulic Elevators:

1. Otis Elevator Company: www.otis.com/#sle.

2. Schindler Elevator Corporation: www.schindler.com/#sle.

C. Substitutions: See Section 016000 - Product Requirements.

D. Products other than Basis of Design are subject to compliance with specified requirements and prior approval of Architect. By using products other than Basis of Design, the Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

E. Source Limitations: Provide elevator and associated equipment and components produced by the same manufacturer as the other elevator equipment used for this project and obtained from a single supplier .

2.02 HYDRAULIC ELEVATORS

A. Hydraulic Passenger Elevator:

1. Hydraulic Elevator Equipment:

a. Holeless hydraulic with 2 stage cylinders mounted within hoistway.

b. Hydrolid Fluid: Enviromax, vegtable-based hydrolic fluid.

2. Drive System:

a. Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating shall be selected for specified speed and load.

3. Operation Control Type:

a. Microprocessor based and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure.

4. Service Control Type:

a. Standard service control only.

5. Interior Car Height: 96 inch.

6. Electrical Power: 208 volts; alternating current (AC); three phase; 60 Hz.

7. Rated Net Capacity: 3500 pounds.

8. Rated Speed: 80 feet per minute.

9. Hoistway Size: As indicated on drawings.

10. Interior Car Platform Size: 6'-8" clear width by 5'-5 1/2" clear depth.

11. Elevator Pit Depth: 48 inch.

12. Overhead Clearance at Top Floor: 152 inch.

13. Travel Distance: As indicated on drawings.

14. Number of Stops: As indicated on drawings.

15. Number of Openings: 1 Front; 1 Rear.

16. Hydraulic Equipment Location: At bottom of elevator pit.

2.03 COMPONENTS

A. Elevator Equipment:

1. Motors, Hydraulic Equipment, Controllers, Controls, Buttons, Wiring, Devices, and Indicators: Comply with NFPA 70. Refer to Section 260583

2. Guide Rails, Cables, Buffers, Attachment Brackets and Anchors: Design criteria for components includes safety factors in accordance with applicable requirements of Elevator Code, ASME A17.1.

3. Buffers:

a. Spring type for elevators with speed less than or equal to 200 feet per minute.

4. Lubrication Equipment:

a. Lubrication Points: Visible and easily accessible.

B. Electrical Equipment:

1. Motors: NEMA MG 1.

2. Boxes, Conduit, Wiring, and Devices: As required by NFPA 70. Refer to Sections 260533.13 and 260583.

3. Spare Conductors: Provide ten percent in extra conductors and two pairs of shielded audio cables in traveling cables.

4. Include wiring and connections to elevator devices remote from hoistway. Provide additional wiring and components as required . Refer to Section 260583.

2.04 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).

B. Accessibility Requirements: Comply with ADA Standards.

C. Comply with seismic design requirements in accordance with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).

1. Complying with Elevator Safety Requirements for Seismic Risk Zone in accordance with ASME A17.1, ASCE 7 and other related requirements.

a. Project Seismic Risk: As indicated on drawings.

2. Provide earthquake emergency operations in accordance with ASME A17.1 requirements.

D. Perform welding of steel in accordance with AWS D1.1/D1.1M.

E. Fabricate and install door and frame assemblies in accordance with NFPA 80 and in compliance with requirements of authorities having jurisdiction.

F. Perform electrical work in accordance with NFPA 70.

G. Comply with fire protection sprinkler system of hoistway design in accordance with NFPA 13 requirements and authorities having jurisdiction (AHJ). Refer to Section 211300.

2.05 OPERATION CONTROLS

A. Elevator Controls: Provide landing operating panels and landing indicator panels.

1. Landing Operating Panels: Metallic type, one for originating "Up" and one for originating "Down" calls, one button only at terminating landings; with illuminating indicators.

2. Landing Indicator Panels: Illuminating.

3. Comply with ADA Standards for elevator controls.

B. Interconnect elevator control system with building fire alarm and smoke alarm systems.

C. Door Operation Controls:

1. Program door control to open doors automatically when car arrives at floor landing.

2. Render "Door Close" button inoperative when car is standing at dispatch landing with doors open.

3. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equipped with photo-electric light rays.

D. Provide "Firefighter's Emergency Operation" in accordance with ASME A17.1, applicable building codes, and authorities having jurisdiction (AHJ).

1. Designated Landing: At 1st floor.

2.06 OPERATION CONTROL TYPE

A. Single Automatic (Push Button) Operation Control: Applies to car in single elevator shaft.

1. Refer to description provided in ASME A17.1.

2. Set system operation so that momentary pressure of landing button dispatches car from other landing to that landing.

3. Allow call registered by momentary pressure of landing button at any time to remain registered until car stops in response to that landing call.

4. If elevator car door is not opened within predetermined period of time after car has stopped at terminal landing allow car to respond to call registered from other landing.

2.07 SERVICE CONTROL TYPE

A. Independent Service Control:

1. Provide key operated "Independent Service" on car operating panel. Key activation will remove that car from normal operation and cancel pre-registered car calls.

2. Car will respond to selected floor. Car will not respond to any calls from landing call buttons. Car will only respond to calls placed on the car operating panel. Doors will remain open at last landing requested. Doors will close with a constant pressure on "Door Close" button.

3. Key activation to normal operation will return car to normal operation.

2.08 EMERGENCY POWER

A. Set-up elevator operation to run with building emergency power supply when the normal building power supply fails, and in compliance with ASME A17.1 requirements.

B. Building Emergency Power Supply: Supplied by backup generator; provide elevator system components as required for emergency power characteristics with phase rotation the same as for normal power.

1. Provide transfer switches and auxiliary contacts.

2. Install connections to power feeders.

C. Emergency Lighting: Comply with ASME A17.1 elevator lighting requirements.

D. Provide operational control circuitry for adapting the change from normal to emergency power.

E. Upon transfer to emergency power, advance elevator to a pre-selected landing, stop car, open doors, disable operating circuits, and hold in standby condition.

2.09 MATERIALS

A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

B. Stainless Steel Sheet: ASTM A666, Type 304; No. 4 Brushed finish unless otherwise indicated.

C. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.

D. Extruded Aluminum: ASTM B221 (ASTM B221M), natural anodized finish unless otherwise indicated.

E. Plywood: PS 1, Structural I, Grade C-D or better, unsanded.

F. Resilient Flooring: Vinyl tile flooring and Sheet flooring, as specified in Section 096500.

G. Plastic Laminate: NEMA LD 3, Type HGS, color as selected by Architect from manufacturer's standard line of colors.

2.10 CAR AND HOISTWAY ENTRANCES

A. Elevator:

1. Car and Hoistway Entrances, Each Elevator Floor Lobby:

a. Hoistway Fire Rating: 1 Hour.

b. Elevator Door Fire Rating: 1 Hour.

c. Framed Opening Finish and Material: Stainless Steel.

d. Car Door Material: Stainless steel, with rigid sandwich panel construction.

e. Hoistway Door Material: Stainless steel, with rigid sandwich panel construction.

f. Door Type: Double leaf.

g. Door Operation: Side Opening, Single Speed.

h. Door Width: 42 inch.

i. Door Height: 84 inch.

j. Sills: Extruded aluminum.

B. Sills/Thresholds: Configure to align with frame return and coordinate with floor finish.

2.11 CAR EQUIPMENT AND MATERIALS

A. Elevator Car, type TKAP:

1. Car Operating Panel: Provide main and auxiliary; flush-mounted applied face plate, with illuminated call buttons corresponding to floors served with "Door Open" button, "Door Close" button, and alarm button.

a. Panel Material: Integral with front return; one per car.

b. Car Floor Position Indicator: Above car operating panel with illuminating position indicators.

c. Locate alarm button where it is unlikely to be accidentally actuated; not more than 54 inch above car finished floor.

d. Provide matching service cabinet integral with front return panel, with hinged door and keyed lock in each car.

e. Provide following within service cabinet as part of car operating panel:

1) Switch for each auxiliary operational control, keyed.

2) Switches for inspection control.

3) Emergency light.

4) Telephone cabinet and hard-wired connection with telephone.

(a) Provide converter for VOIP type Telephone.

f. Provide convenience outlet receptacle; 110VAC, 15 amps, locate below service cabinet.

2. Ventilation: Single speed fan with grille in ceiling.

3. Flooring: Resilient vinyl tile.

4. Wall Base: Recessed stainless steel, 4 inch high.

5. Front Return Panel: Stainless steel.

6. Door Wall: Plastic laminate on plywood.

7. Side Walls: Plastic laminate on plywood.

8. Rear Wall: Plastic laminate on plywood.

9. Bumper Rail: Stainless steel, at all three sides. Provide open clearance space 1-1/2 inch (38 mm) wide to face of wall.

    a. Flat Bar Stock, Solid: 1/4 inch thick by 2 inches high.

    b. Stainless Steel Finish: No. 4 Brushed.

10. Ceiling:

    a. Concealed Frame Suspended Ceiling: Stainless steel, mount 7 inch below car canopy with 1-1/2 inch nominal space between edge of ceiling and wall.

    b. Lay-in Panel: Translucent, polycarbonate panels.

    c. Lighting: LED downlights.

B. Car Accessories:

1. Protective Pads: Canvas cover, padded with impact-resistant fill material, sewn with piping edges; fire resistant in compliance with ASME A17.1; brass grommets for supports, covering side and rear walls and front return, with cut-out for control panel; provide one set for each elevator.

    a. Color: As selected by Architect.

    b. Provide at least 4 inch clearance from bottom of pad to finished floor.

    c. Pad Supports: Stainless steel studs, and mounted from top of wall panels.

2. Pit Ladder: Provide painted steel pit ladder in a pit wall recess as indicated on the drawings.

3. Disconnect Switch: Provide disconnect and breaker with controler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that hoistway and pit are ready for work of this section.

C. Verify hoistway shaft and openings are of correct size and within tolerance.

D. Verify location and size of machine foundation and position of machine foundation bolts.

E. Verify that electrical power is available and of correct characteristics.

3.02 PREPARATION

A. Arrange for temporary electrical power for installation work and testing of elevator components, and comply with requirements of Section 015000 - Temporary Facilities and Controls.

B. Maintain elevator pit excavation free of water.

3.03 INSTALLATION

A. Coordinate this work with installation of hoistway wall construction.

B. Install system components, and connect equipment to building utilities.

C. Provide conduit, electrical boxes, wiring, and accessories. Refer to Sections 260533.13 and 260583.

D. Install hydraulic piping between cylinder and pump unit.

E. Mount machines, motors, and pumps on vibration and acoustic isolators.

1. Place on structural supports and bearing plates.

2. Securely fasten to building supports.

3. Prevent lateral displacement.

F. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.

G. Install guide rails to allow for thermal expansion and contraction movement of guide rails.

H. Accurately machine and align guide rails, forming smooth joints with machined splice plates.

I. Obtain brackets or bracket inserts from elevator company before they are required to be installed in the work & coordinate the installation with the elevator manufacturer.

J. Bolt brackets to inserts placed in concrete form work.

K. Install hoistway door sills, frames, and headers in hoistway walls; grout sills in place, set hoistway floor entrances in alignment with car openings, and align plumb with hoistway.

L. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.

M. Wood Surfaces not Exposed to Public View: Finish with one coat primer; one coat enamel.

N. Adjust equipment for smooth and quiet operation.

O. Fire caulk between elevator door and shaft wall and between controller and shaft wall.

3.04 TOLERANCES

A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.

B. Car Movement on Aligned Guide Rails: Smooth movement, without any objectionable lateral or oscillating movement or vibration.

3.05 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Testing and inspection by regulatory agencies certified in accordance with ASME QEI 1 will be performed at their discretion.

1. Schedule tests with agencies and notify Owner and Architect.

2. Obtain permits as required to perform tests.

3. Perform tests required by regulatory agencies.

4. Furnish test and approval certificates issued by authorities having jurisdiction.

C. Perform testing and inspection in accordance with requirements.

1. Inspectors shall be certified in accordance with ASME QEI 1.

2. Perform tests as required by ASME A17.2.

3. Provide at least two weeks written notice of date and time of tests and inspections.

4. Supply instruments and execute specific tests.

D. Operational Tests:

1. Perform operational tests in the presence of Owner and Architect.

2. Test single elevator system by transporting at least 4 persons up from main floor to top floor landings during a five minute period.

3. At an agreed time, and the building occupied with normal building traffic, conduct tests to verify performance.

a. Furnish event recording of each landing call registrations, time initiated, and response time throughout entire working day.

3.06 ADJUSTING

A. Adjust for smooth acceleration and deceleration of car to minimize passenger discomfort.

B. Adjust with automatic floor leveling feature at each floor landing to reach 1/4 inch maximum from flush with sill.

3.07 CLEANING

A. Remove protective coverings from finished surfaces.

B. Clean surfaces and components in accordance with manufacturers written instructions.

3.08 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - Demonstration and Training, for additional requirements.

C. Demonstrate proper operation of equipment to Owner's designated representative.

D. Demonstration: Demonstrate operation of system to Owner's personnel.

1. Use operation and maintenance data as reference during demonstration.

2. Briefly describe function, operation, cleaning and maintenance of each component.

E. Training: Train Owner's personnel on cleaning and operation and maintenance of system.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

2. Provide minimum of two hours of training.

3. Location: At project site, unless noted otherwise.

3.09 PROTECTION

A. Do not permit construction traffic within car after cleaning.

B. Protect installed products until Date of Substantial Completion.

C. Touch-up, repair, or replace damaged products and materials prior to Date of Substantial Completion.

3.10 MAINTENANCE

A. Refer to Section 017000 - Execution and Closeout Requirements, for additional requirements relating to initial maintenance service.

B. Provide Initial Maintenance Contract of elevator system and components in accordance with ASME A17.1 and requirements as indicated for 3 months from Date of Substantial Completion.

C. Perform maintenance contract services using competent and qualified personnel under the supervision and direct employ of the elevator manufacturer or original installer.

D. Maintenance contract services shall not be assigned or transferred to any agent or other entity without prior written consent of Owner.

E. Include systematic examination, adjustment, and lubrication of elevator equipment.

F. Maintain and repair or replace parts, whenever required, using parts produced by original equipment manufacturer.

G. Perform work without removing cars from use during peak traffic periods.

H. Provide emergency call back service during regular working hours throughout period of this maintenance contract.

END OF SECTION