

SECTION 14240 HYDRAULIC PASSENGER ELEVATORS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Hydraulic passenger elevators as shown and specified. Elevator work includes:
1. Standard pre-engineered hydraulic passenger elevators.
  2. Elevator car enclosures, hoistway entrances and signal equipment.
  3. Jack(s).
  4. Operation and control systems.
  5. Accessibility provisions for physically disabled persons.
  6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
  7. Materials and accessories as required to complete the elevator installation.
- B. Related Sections:
1. Division 3 Concrete: Installing inserts, sleeves and anchors in concrete.
  2. Division 4 Masonry: Installing inserts, sleeves and anchors in masonry.
  3. Division 5 Metals:
    - a. Providing hoist beams, pit ladders, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
    - b. Providing steel angle sill supports and grouting hoistway entrance sills and frames.
  4. Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
  5. Division 22 Plumbing:
    - a. Sump pit and oil interceptor.
  6. Division 23: Heating, Ventilation and Air Conditioning
    - a. Heating and ventilating hoistways and machine rooms.
  7. Division 16 Sections:
    - a. Providing electrical service to elevators, including fused disconnect switches.
    - b. Emergency power supply, transfer switch and auxiliary contacts.
    - c. Heat and smoke sensing devices.
    - d. Convenience outlets and illumination in machine room, hoistway and pit.
- C. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Section 300 for hydraulic elevators. State or local requirements must be used if more stringent.
1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
  2. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.
  3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2" at any point.
  4. Elevator hoistways shall have barricades, as required.
  5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.

6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 42" minimum, (48" minimum for A17.1-2000 areas) shall be provided at the same height, above sill of access door or handgrips.
9. Machine room to be enclosed and protected.
10. Machine Room temperature must be maintained between 55° and 90° F.
11. If machine room is remote from the elevator hoistway, clear access must be available above the ceiling or metal/concrete raceways in floor for oil line and wiring duct from machine room.
12. Access to the machinery space and machine room must be in accordance with the governing authority or code.
13. Provide an 8" x 16" cutout through machine room wall, for oil line and wiring duct, coordinated with elevator contractor at the building site.
14. All wire and conduit should run remote from either the hoistways or the machine room.
15. When heat, smoke or combustion sensing devices are required, connect to elevator machine room terminals. Contacts on the sensors should be sided for 120 volt D.C.
16. Install and furnish finished flooring in elevator cab.
17. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.
18. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
19. Before erection of rough walls and doors; place entrance/guide rail mounting brackets and erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
20. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.
21. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
22. General Contractor shall fill and grout around entrances, as required.
23. All walls and sill supports must be plumb where openings occur.
24. Locate a light fixture and convenience outlet in pit with switch located adjacent to the access door.
25. A light switch and fused disconnect switch for each elevator should be located inside the machine room adjacent to the door, where practical, per the National Electrical Code (NFPA No. 70).
26. As indicated by elevator contractor, provide a light outlet for each elevator, in center of hoistway (or in the machine room).
27. For signal systems and power operated door: provide ground and branch wiring circuits, including main line switch. For car light and fan: provide a feeder and branch wiring circuits, including main line switch.
28. Wall thickness may increase when fixtures are mounted in drywall. These requirements must be coordinated between the general contractor and the elevator contractor.
29. Provide supports, patching and recesses to accommodate hall button boxes, signal fixtures, etc..

30. Locate telephone and convenience outlet on control panel.

## 1.02 SUBMITTALS

- A. Product data: When requested, the elevator contractor will provide standard cab, entrance and signal fixture data to describe product for approval.
- B. Shop drawings:
  - 1. Show equipment arrangement in the machine room/control space, pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
  - 2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
  - 3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
  - 4. Indicate electrical power requirements and branch circuit protection device recommendations.
- C. Enamel Selections and Plastic Laminate Selections: Samples of exposed finishes are available upon request.
- D. Metal Finishes: Upon request, standard metal samples provided.
- E. Operation and maintenance data. Include the following:
  - 1. Owners Manual and Wiring Diagrams.
  - 2. Parts list, with recommended parts inventory.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An approved manufacturer with minimum fifteen years experience in manufacturing, installing, and servicing elevators of the type required for the project.
  - 1. 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.
    - a. The major parts of the elevator equipment shall be manufactured in the United States, and not be an assembled system.
  - 2. The manufacturer shall have a documented, on-going quality assurance program.
  - 3. ISO-9001:2000 Manufacturer Certified
  - 4. ISO-14001:2004 Environmental Management System Certified
- B. 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.
- C. Regulatory Requirements:
  - 1. ASME/ANSI A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
  - 2. Building Code: National.
  - 3. NFPA 70 National Electrical Code.

4. NFPA 80 Fire Doors and Windows.
  5. Americans with Disabilities Act Accessibility Guidelines (ADAAG).
  6. CAN/CSA C22.1 Canadian Electrical Code.
  7. CAN/CSA B44 Safety Code for Elevators and Escalators.
- D. Fire-rated Entrance Assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(b), and NFPA 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).
- E. 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.

#### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Manufacturing will deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

#### 1.05 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.

#### 1.06 WARRANTY

- A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months from date of Substantial Completion.

#### 1.07 MAINTENANCE

- A. Furnish maintenance and call back service for a period of 12 months for each elevator from 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 / OPERATIONS

#### 2.01 MANUFACTURERS

- A. Manufacturer: ThyssenKrupp Elevator Model AMEE G Series. Or approved equal alternate by Otis Elevator Corporation or Schindler Elevator Corporation.

## 2.02 MATERIALS, GENERAL

- A. Colors, patterns, and finishes: As selected by the Architect from manufacturer's standard colors, patterns, and finish charts.
- B. Steel:
  - 1. Shapes and bars: Carbon.
  - 2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
  - 3. Finish: Factory-applied enamel.
- C. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness.
- D. Carpet: By others.

## 2.03 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed.
- B. Sling: Jack casing affixed to a steel crosshead piece that integrates into the design of the ceiling and bolted directly to the platform with bracing members to remove strain from the car enclosure.
- C. Guide Rail/Entrance Combo: Steel, guide rail and entrance combination fastened to the front of the building structure with steel brackets.
- D. Guide Shoes: Shall be mounted on top and bottom of the car.
- E. Buffers: Provide buffers integrated to the bottom of the jack plunger. Mount buffers on a steel jack mount that is securely anchored to the pit floor.
- F. Jack: Jack units shall be of sufficient size to lift the gross load the height specified. Jacks to be factory tested to ensure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide either of the following jack types, depending on application and travel requirements: Two holeless, inverted single-stage jacks or two holeless, inverted telescoping jacks as a dual-stage option. Provide two jacks, piped together, mounted as a structural member of the sling with each being designed to extend when oil is pumped into the assembly. Each jack section will be guided from within the casing or the plunger assembly used to house the section. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Both types of jacks shall be designed to be mounted on a specially designed jack stand anchored to the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section.
- G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the landings and correct for overtravel or undertravel. 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.

- H. 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. Provide proper grade oil as specified by the manufacturer of the power unit.

## 2.04 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit consisting of the following items:
1. Oil reservoir with tank cover.
  2. An oil hydraulic pump.
  3. An electric motor.
  4. 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.
- B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with 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.
- C. Motor: Standard manufacturer's motor. Duty rating shall be selected for specified speed and load.
- D. Control System: Shall be microprocessor based and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure.
- E. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and made without removing the assembly from the oil line.
1. Relief valve shall be externally 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.
  2. 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.
  3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
  4. 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.
- F. Hydraulic Fluid: Provide hydraulic oil that is inherently biodegradable and meets the low acute toxicity criteria of the U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency for fish and invertebrates. Product will not be formulated with common, metal-containing performance additives that can persist in the environment. Other types of hydraulic fluids

shall not be permissible.

## 2.05 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.
  - 1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates, integral sight guards, and necessary hardware.
  - 2. Main landing door & frame finish: Stainless steel panels, no. 4 brushed finish.
  - 3. Typical door & frame finish: Stainless steel panels with no. 4 brushed finish.
- B. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.
- C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
  - 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
  - 2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
  - 3. Tracks: Door tracks for single speed and center opening formed as part of the header..
- D. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

## 2.06 CAR ENCLOSURE

- A. Car Enclosure:
  - 1. Walls: G Series Cab, constructed of 16 gauge steel posts with durable wood core panels interlocked between. Wood core panels shall have no added Urea-Formaldehyde resin.
    - a. Wall panels: Shall be finished on both sides with high pressure plastic laminate.
    - b. Cab posts: Shall have a black powder coat finish.
  - 2. Canopy: Cold-rolled steel with hinged exit.
  - 3. Ceiling: LED lighting system with a translucent diffuser mounted to a metal frame.
  - 4. Cab Fronts, Return Column, Transom, and Strike: Provide panels and posts made of carbon steel. Return made of durable wood core, finished to match cab panels.
  - 5. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
    - a. Door Finish: Steel: Stainless steel panels: No. 4 brushed finish.
    - b. Cab Sills: Extruded aluminum, mill finish.
  - 6. Handrail: Provide 1.5" diameter cylindrical metal on rear walls, where required by code. Provide on side walls as an option. Handrail shall have a stainless steel, no. 4 brushed finish.
  - 7. Ventilation: Provide top and bottom grilles, as required by code, located in the front return panel.
- B. 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.

## 2.07 DOOR OPERATION

- A. Door Operation: Provide a direct current motor driven 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.
  - 1. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.
- B. 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.

## 2.08 CAR OPERATING STATION

- A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation as detailed below, mounted in a fixed return having a conventional type return panel.
  - 1. The main car operating panel shall be mounted in the return and comply with handicap requirements.
  - 2. Provide black pushbuttons with black trim ring and nickel silver bezel. Pushbuttons shall illuminate using long lasting LED's and shall be included for each floor served.
  - 3. Provide Smart Braille adjacent to the pushbuttons.
  - 4. Include emergency buttons and switches as required per code.
  - 5. Switches for car light and accessories shall be provided.
  - 6. All polycarbonate pushbuttons shall be manufactured with Microban® antimicrobial protection.
- B. Emergency Communications System: Integral ADA phone system is provided.
- C. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

## 2.09 CONTROL SYSTEMS

- A. GController: The elevator control system shall be microprocessor based and software oriented. 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.
- B. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fans during periods of inactivity. The settings shall be field programmable.

## 2.10 HALL STATIONS

- A. Hall Stations, General:  
Provide one pushbutton riser with faceplates having a brushed stainless steel appearance.
  - 1. Phase 1 firefighter's service key switch, with in mold graphical instructions, either as a separate fixture or incorporated into the hall station at the designated level.
  - 2. All polycarbonate pushbuttons shall be manufactured with Microban® antimicrobial protection.
- B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.
- C. Combination Hall Position Indicator and Hall Lantern: Not Applicable
- D. Hall lanterns: Not Applicable

## 2.11 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Hydraulic Oil Strainer: Install a hydraulic oil strainer at the power unit location.
- B. Hydraulic Oil Silencer (Optional): Install a hydraulic oil silencer at the power unit location as an option to the strainer. The silencer shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and machine rooms/control space, as constructed and verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

### 3.02 INSTALLATION

- A. Install elevator systems components and coordinate installation of hoistway wall construction.
  - 1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
  - 2. Comply with the National Electrical Code for electrical work required during installation.
- B. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- C. Alignment: Coordinate installation of hoistway entrances with installation of elevator entrance/guide rail combination for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
- D. Lubricate operating parts of system where recommended by manufacturer.

### 3.03 FIELD QUALITY CONTROL

- A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required by A17.1 Code and local authorities having jurisdiction. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

### 3.04 ADJUSTING

- A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

### 3.05 CLEANING

- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; shall not be cleaned with bleached-based cleansers.
- B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.

### 3.06 PROTECTION

- A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

### 3.07 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.
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

### 3.08 ELEVATOR SCHEDULE

- A. Elevator Number 1
  - 1. Elevator Model: AMEE G21
  - 2. Rated Capacity: 2100 lbs.
  - 3. Rated Speed: 75 fpm
  - 4. Operation System: GController
  - 5. Travel: 11'-8"
  - 6. Landings: 1 total
  - 7. Openings:
    - a. Front: 1
    - b. Rear: 0
  - 8. Clear Car Inside: 5' - 8" wide x 4' - 3" deep
  - 9. Cab Height: 8'-0" nominal
  - 10. Hoistway Entrance Size: 3' - 0" wide x 7'-0" high
  - 11. Door Type: Single Speed
  - 12. Power Characteristics: 208 volts, 3 Phase, 60 Hz.
  - 13. Seismic Requirements: Zone 1
  - 14. Fixture & Button Style: Studio Signal Fixtures with Microban® antimicrobial protection.

### 3.09 SPECIAL CONDITIONS (Note: Add Special Conditions as Needed)

END OF SECTION 14240