

## SECTION 142150 - GEARLESS MACHINE-ROOM-LESS TRACTION ELEVATORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. General: Provide manufacturer's standard elevator systems. 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. The work required under this section consists of all labor, materials and services required for the complete installation (including operational verification) of all the equipment required for the elevators as herein specified.

Section Includes: Gearless Machine-Room-Less (MRL) Traction elevators as follows:

1. One (1) Passenger Elevator, Car PE1
- B. Products Installed but Not Furnished Under This Section:
1. Emergency Voice/Alarm Communication System Provisions
  2. Car flooring
- C. Related Sections:
1. 03 30 00 Cast-in-Place Concrete
  2. 04 20 00 Unit Masonry
  3. 09 00 00 Finishes
  4. 21 00 00 General Requirements for Fire Suppression
  5. 23 00 10 Mechanical General Conditions
  6. 25 00 00 Building Automation and Control
  7. 26 00 10 Electrical General Conditions
  8. 26 05 00 Common Work Results for Electrical
  9. 27 30 00 Voice Communications
  10. 28 31 11 Digital, Addressable Fire Alarm System
- D. The stipulated design criteria and parameters specified herein are intended as a guide to the overall design, construction, and materials required and should not be construed as an engineered design. These stipulations do not cover all necessary features to ensure satisfactory, AHJ approved operation and do not absolve the Contractor of their requirement to provide an elevator system that complies with applicable code, and is smooth, quiet, durable and efficient, while providing economy of maintenance.

#### 1.2 ALLOWANCES

- A. Elevator Car Allowances: Provide \$10,000 and 1,000 lbs. weight allowance per elevator for an interior finish allowance for the passenger elevators. The allowances include furnishing and installing the following items:
1. Car wall finishes, including trim
  2. Car ceiling, including lighting, wiring, and coordination of battery-operated emergency lighting
  3. Car door, transom and return finishes
  4. Handrails
  5. Car subfloor and fastening
  6. Mounting for protective pads
  7. Protective pads

8. Assistance of IUEC approved installers.

### 1.3 APPLICABLE CODES

- A. Performed work will comply with the following Federal, State and Municipal codes applicable at time of Contract execution, as determined by the Authority Having Jurisdiction (AHJ), or by the most stringent code applicable. Compliance with these codes, including alternates, interpretations or modifications, are the responsibility of the Contractor.
  1. ASME: Safety Code for Elevators and Escalators, A17.1
  2. ASME: Guide for Inspection of Elevators, Escalators and Moving Walks Inspectors Manual A17.2, A17.5, A17.6, A17.7
  3. ANSI: Accessible and Usable Buildings and Facilities A117.1
  4. IBC: International Building Code
  5. NEC: National Electrical Code
  6. NFPA: NFPA 101 Life Safety Code
  7. NFPA: National Fire Alarm and Signaling Code
  8. ADA: Standards for Accessible Design
  9. Local and State laws applicable to project location

### 1.4 REFERENCE STANDARDS

1. ANSI: American National Standards Institute.
2. ASTM: American Society for Testing and Material.
3. AWS: American Welding Society.
4. IEEE: Institute of Electronic and Electrical Engineers.
5. NEMA: National Electrical Manufacturers Association.
6. NFPA 70: National Fire Protection Association.
7. NBS: National Bureau of Standards.
8. OSHA: Occupational Safety and Health Administration.
9. UL: Underwriters Laboratories.

### 1.5 DEFINITIONS

- A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; 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.
- B. Technical definitions as defined in ASME A17.1, AHJ adopted edition.
- C. Terms:
  1. "Provide": To supply, install, connect and make ready for safe and normal operation the complete elevator system as specified herein.
  2. "Install": To erect, mount, and connect complete with related accessories.
  3. "Supply": To purchase, procure, acquire and deliver complete with related accessories.
  4. "Work": Labor, materials, equipment, apparatus, controls, accessories and other items required for proper and complete installation.
  5. "Wiring": Conduit, fittings, wire, traveling cables, junction and outlet boxes, switches, cutouts, receptacles, related items and accessories.
  6. "Similar" or "Equal": Approved material, weight, size, design, and characteristics to the specified product.
  7. "Approved", "Satisfactory", "Accepted", or "Directed": As approved, satisfactory, accepted or directed by or to the Owner.

8. "Owner": Shall be defined as person or company holding title to property in which this specified work is to be performed or his appointed representative(s).
9. "Contractor": Shall be defined as the elevator company performing the work described in these specifications.
10. "Architect": MacDonald and Mack
11. "Consultant": Elevator Advisory Group

## 1.6 DOCUMENT VERIFICATION

- A. In order to discover and resolve conflicts or lack of definition which may impede the project outcome, the elevator manufacturer must review contract documents for compatibility with its product prior to bidding. This includes a thorough review of the elevator, architectural, structural electrical, mechanical and low voltage documents.
- B. Submit specific, written exceptions and/or clarifications with quotation. Compliance with provisions of contract documents is assumed and required in the absence of a written exception.
- C. Owner will not pay for change to related work systems required to accommodate manufacturer's equipment if not identified before Contract Award.
- D. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication, or erection methods, or techniques provided design intent is maintained, as determined by the Owner, Architect and /or Consultant. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

## 1.7 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
- B. Shop Drawings. Provide electronic copies of the following:
  1. Fixture and signaling shop drawings
  2. Cab layout detailing finishes, dimensions and assembly
  3. Detailed cut sheets highlighting coordination with building structure (MEP and Structural reactions)
  4. Machine room, control room and hoistway plans and sections
  5. Power data including electrical starting/ running currents and heat loads
  6. Cut sheets for security and remote monitoring provisions

It is understood that approval of the drawings and cut sheets by the Owner, Architect or Consultant shall be for general arrangement only and do not include measurement verification which remains the responsibility of the Contractor, as does the verification of actual conditions against the Contract Documents.

- C. Samples. Provide:
  1. 3" square samples of cab finishes
- D. Maintenance Data.

Prior to Final Acceptance, provide four (2) sets of bound instructions and three (3) sets of instructions in electronic format, which include:

1. Service manuals that include written information necessary for proper maintenance and adjustment of the equipment, including testing procedures and troubleshooting.
2. As-built controller straight line diagrams
3. Lubricating instructions
4. Parts catalogue

- E. Diagnostic Test Equipment and Instructions: Provide all diagnostic test devices together with one set of all supporting information necessary for interpretation of test data and troubleshooting of system. The elevator installation shall be a design that can be maintainable by any licensed elevator maintenance company employing journeymen mechanics, without the need to purchase or lease additional diagnostic devices, special tools, or instructions from the original equipment manufacturer.

#### 1.8 PERMITS AND TESTING

- A. Make application for, secure and pay for all necessary permits and certificates of inspection for all equipment included herein, as required by the various departments of the Local and State Authorities. Furnish the Owner with permits and certificates while also providing laminated copies in the respective machine rooms or closets.
- B. Any damage of any kind to the car or the adjoining structure which may develop through performance of any tests or inspections shall be repaired at no additional costs to the Owner.

#### 1.9 QUALITY ASSURANCE

- A. Manufacturer and Installer Qualifications: Manufacturer with not less than 10 years experience with successful production of products and systems similar to scope of this Project, with a record of successful in-service performance and completion of projects for a period of not less than 5 years and with sufficient production capability, facilities, and personnel to produce required Work.
- B. Supervision: Installer shall maintain a competent supervisor who is at project site during times specified Work is in progress and who is experienced in installing systems similar to type and scope required for project.
- C. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

#### 1.10 PATENTS

- A. Contractor agrees to defend, and hold harmless, the Owner, Architect, and Consultant, and agents and employees thereof, from any liability due to patent infringement from performing the work as detailed in the Contract Documents.

#### 1.11 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.

- B. Failures include, but are not limited to: operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
- C. Warranty Period: One year from date of Substantial Completion.

#### 1.12 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall provide twelve months full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 1. Perform maintenance during normal working hours.
  - 2. Perform emergency callback service during normal working hours Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of sixty minutes or less.
- B. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard three-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

### PART 2 - PRODUCTS

#### 2.1 ELEVATORS

- A. Gearless MRL Passenger Elevator Description:
  - 1. Elevator Identification: Car PE1
  - 2. Capacity: 3500 lbs.
  - 3. Class of Loading: Class A
  - 4. Contract Speed: 200 fpm
  - 5. Machine: Gearless
  - 6. Machine Location: Overhead machine room less
  - 7. Controller location: In jamb
  - 8. Counterweight location: Side
  - 9. Stops: 4 Front, 1 Rear
  - 10. Openings: 4 Front, 1 Rear
  - 11. Minimum Clear to underside of canopy: 8' High
  - 12. Entrance Size: 3'-6" Wide X 7' High
  - 13. Entrance Type: Single center opening

#### 2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Otis Elevator Company
  - 2. ThyssenKrupp Elevator
  - 3. KONE
  - 4. Schindler

- B. Approved Components:
  - 1. Fixtures vandal-resistant.

## 2.3 MATERIALS AND COMPONENTS

- A. General: Provide manufacturer's standard elevator systems. 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. Omit all logos from exposed surfaces.
- B. Inserts: Furnish required concrete inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.
- C. Machine Beams: If necessary, provide framing to support elevator hoisting machine and deflector sheaves from the building structure. Comply with Division 05 Section "Structural Steel Framing" for materials and fabrication. Coordinate with General Contractor.
- D. Electrical Wiring:
  - 1. Provide 10% spare wires between each controller, selector, hoistway junction box, and control panel; also provide 10% spare conductors in each travel cable; all spares shall be properly tagged or otherwise identified with clear and indelible markings.
  - 2. Provide a total of twelve (12), 20 gauge shielded pairs for communication and security use in the traveling cables for each elevator. The shielded pairs shall be located in a cable which is not used to carry alternating current circuits. The shielded wiring shall extend to a junction box in the elevator controllers in machine room.
- E. Steel:
  - 1. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial quality carbon steel, complying with ASTM A366, matte finish.
  - 2. Sheet Steel (for Unexposed Work): Hot-rolled, commercial quality carbon steel, pickled and oiled, complying with ASTM A568/A568M-03.
  - 3. Structural Steel Shapes and Plates: ASTM A36.
- F. Stainless Steel: Type 302 or 304 complying with ASTM A240, with standard tempers and hardness required for fabrication, strength, and durability. Apply mechanical finish on fabricated work in the locations shown or specified, Federal Standard and NAAMM nomenclature, with texture and reflectivity required to match Architect's sample. Protect with adhesive paper covering.
  - 1. No. 4 Satin: Directional polish finish. Graining directions as shown or, if not shown, in longest dimension.
  - 2. No. 8 Mirror: Reflective polish finish with no visible graining.
  - 3. Textured: .050 inches mean pattern depth with bright directional polish (No. 4 satin finish).
    - a. 2WL or 5WL as manufactured by Rigidized Metals.
    - b. 5-SM as manufactured by Rimex Metals.
  - 4. Burnished: Non-directional, random abrasion pattern.
- G. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.
- H. Plastic Laminate: ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050" ±.005" thick, color and texture as follows:
  - 1. Exposed Surfaces: Color and texture selected by Architect.
  - 2. Concealed Surfaces: Manufacturer's standard color and finish.

- I. Fire-Retardant Treated Particle Board Panels: Minimum 3/4" thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing; meet ASTM E84 Class "I" rating with a flame-spread rating of 25 or less, registered with Local Authorities for elevator finish materials.
- J. Natural Finish Wood Veneer: Standard thickness, 1/40" thoroughly dried conforming to ASME/HPMA HP-1983, Premium Grade. Place veneer, tapeless spliced with grain running in direction shown, belt, and polish sanded, book-matched.
  - 1. Species and Finish: As shown on Drawings.
- K. Paint Finishes, General: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. Galvanized metal need not be painted.
  - 1. Prime Finish: Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of primer.
- L. Baked Enamel Finish: Prime finish per above. Unless specified "prime finish" only, apply and bake three additional coats of enamel in the selected solid color.
- M. Tile: Refer to Section 09310, Vinyl Composition Tile.
- N. Paint. Provide:
  - 1. Two (2) coats of rust inhibiting paint on all exposed or non painted metals in the machine room and hoistway.
  - 2. Two (2) coats of enamel paint on the machine room floors.
  - 3. Two (2) coats of vinyl white paint on the machine room walls

## 2.4 CAR PERFORMANCE

- A. Speed Control: Suitable for operation specified and capable of providing smooth, comfortable car acceleration, and dynamic braking. Limit the difference in car speed between full load and no load to not more than +/-3% of the contract speed.
- B. Car Capacity: Safely lower, stop and hold 125% of rated load.
- C. Automatic Stopping Zone: Stop car within 1/4" above or below the landing sill. Avoid over travel/ under travel, and maintain stopping accuracy regardless of load in car, direction of travel, or distance between landings, rope slippage or stretch.

## 2.5 OPERATION

- A. Selective Collective Microprocessor-Based, PE1:
  - 1. Operate car without attendant from pushbuttons in car and at each floor. When car is available, automatically start car, and dispatch it to floor corresponding to registered car or hall call. Once car starts, respond to registered calls in direction of travel and in the order the floors are reached.
  - 2. Reverse car direction only when all car calls have been answered, or all hall and car calls ahead of car and corresponding to the direction of car travel have been answered.
  - 3. Slow car and stop automatically at floors corresponding to registered calls, in the order in which they are approached in direction of travel. As slowdown is initiated for a hall call, automatically cancel hall call. Cancel car calls in the same manner. Hold car at arrival floor an adjustable time interval to allow passenger transfer.

4. Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is highest (or lowest) call registered.
  5. Illuminate appropriate pushbutton to indicate call registration. Extinguish light when call is answered.
- B. Other Items:
1. Load Weighing: Provide means via cable tension monitors for weighing car passenger load. Control system to provide dispatching at main floor in advance of normal intervals when car fills to capacity. Provide hall call by-pass when the car is filled to preset percentage of rated capacity and traveling in down direction. Field adjustment range: 10% to 100%.
  2. Anti-Nuisance Feature: If car loading relative to weight in car is not commensurate with number of registered car calls, or activation of door protection device is not commensurate with number of registered car calls, cancel car calls.
- C. Car-to-Lobby Feature: Provide the means in the main hall pushbutton station for automatic return to the recall floor. Return car nonstop after answering pre-registered car calls, and park with doors open for an adjustable time period of 60-90 seconds. Upon expiration of time period, car shall automatically revert to normal operation and close doors until assigned as next car or until the car is placed on independent service.
- D. Firefighters' Service: Provide equipment and operation in accordance with code requirements.
- E. Motion Control: Microprocessor-based AC variable-voltage, variable frequency with digitally encoded closed-loop velocity feedback suitable for operation specified and capable of providing smooth, comfortable car acceleration, retardation, and dynamic braking. Limit the difference in car speed between full load and no load to not more than  $\pm 3\%$  of the contract speed.
- F. Standby Lighting and Alarm: Car mounted battery unit with solid-state charger to operate alarm bell and car emergency lighting. Battery to be rechargeable with minimum five-year life expectancy. Provide constant pressure test button in service compartment of car operating panel. Provide lighting integral with portion of normal car lighting system.
- G. Door Operation: Automatically open doors when car arrives at main floor. At expiration of normal dwell time, close doors. Provide front or rear selective door operation.
- H. Standby Lighting and Alarm: Car mounted battery unit with solid-state charger to operate alarm.
- I. Battery Automatic Rescue Operation: Upon loss of normal power automatically lower or raise the car to the nearest landing depending on the load in the car. Upon arrival at the landing, the elevator doors shall open automatically and remain open until regular door time has expired. The elevator shall then be removed from service. The auxiliary power source shall be provided via 12-volt D.C. battery units installed in machine space. Include solid-state charger and testing means mounted in a common metal container. Battery to be rechargeable lead acid or nickel cadmium with a ten-year life expectancy. Upon restoration of normal power, the elevator shall automatically resume normal operation.
- 2.6 EQUIPMENT SPACE
- A. Arrange equipment in spaces shown on drawings.
- B. Traction Hoist Machine:
1. AC induction ACV<sup>3</sup>F gearless traction type motor with brakes, drive sheave, and deflector sheave mounted in proper alignment on a common, isolated bedplate.



2. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.
- C. Encoder: Direct drive, solid-state, digital type. Update car position at each floor and automatically restore after power loss.
- D. Controller: UL/CSA labeled. Locate in door jamb at top floor.
1. Compartment: Securely mount all assemblies, power supplies, chassis switches, relays, etc., on a substantial, self-supporting steel frame. Completely enclose equipment with covers. Provide means to prevent overheating.
  2. Wiring: CSA labeled copper for factory wiring. Neatly route all wiring interconnections and securely attach wiring connections to studs or terminals.
  3. Permanently mark components (relays, fuses, PC boards, etc.) with symbols shown on wiring diagrams.
- E. Machine and Equipment Support Beams: Rail supported by Elevator contractor
1. Provide bearing plates, anchors, shelf angles, blocking, embedment, etc., for support and fastening of machine beams or equipment to the building structure.
  2. Isolate machine and overhead sheave beams to prevent noise and vibration transmission to building structure.
- F. Governor: Centrifugal-type, car driven located in control space with pull-through jaws and bi-directional shutdown switches. Provide required bracketing and supports for attachment to building structure. Provide ladders and platforms with handrails and toeboards for governor access. Provide remote reset capability.
- G. Emergency Brake:
1. Provide means to prevent ascending car over-speed and unintended car movement per Code.

## 2.7 HOISTWAY EQUIPMENT

- A. Guide Rails: Planed steel T-sections for car and counterweight of suitable size and weight for the application. Provide rail backing and intermediate counterweight tie brackets. Provide bracketing, at top and bottom of floor beams. No additional structural points of attachment other than those shown on the Contract Documents will be provided.
1. Provide any additional structural steel or supports to achieve code-required rail deflection limits, as required by manufacturer's design and system. Provide intermediate structural supports as required for manufacturer's design and system. No additional structural points of attachment other than those shown on the Contract Documents will be provided
- B. Buffers: Oil type with blocking and support channels.
- C. Equipment Access: Provide buffer access ladders and platforms. Stencil car number on buffer.
- D. Sheaves: Machined grooves and sealed bearings. Provide mounting to machine beams, machine bedplate, car and counterweight structural members, or building structure.
- E. Counterweight: Steel frame with metal filler weights.
- F. Counterweight Guide Shoes: solid guides with oilless inserts.
- G. Governor Rope and Encoder Tape Tensioning Sheaves: Mount sheaves and support frame on pit floor or guide rail. Provide frame with guides or pivot point to enable free vertical movement and proper tension of rope and tape.

- H. Suspension Means:
  1. 8 x 19 or 8 x 25 Seale construction, traction steel type. Fasten with staggered length, adjustable, spring isolated wedge type shackles.
  2. Coated, flat belt with imbedded steel cables.
  3. Approved governor rope.
  
- I. Terminal Stopping: Provide normal and final devices. Provide emergency terminal speed limiting devices.
  
- J. Electrical Wiring and Wiring Connections:
  1. Conductors and Connections: Copper throughout with individual wires coded and connections on identified studs or terminal blocks. Use no splices or similar connections in wiring except at terminal blocks, control compartments, or junction boxes. Provide 10% spare conductors throughout. Run spare wires from car connection points to individual elevator controllers in the equipment space.
  2. Conduit: Galvanized steel conduit, EMT, or duct. Flexible conduit length not to exceed 3'-0". Flexible heavy-duty service cord may be used between fixed car wiring and car door switches for door protective devices.
  3. Traveling Cables: Flame and moisture-resistant outer cover. Prevent traveling cable from rubbing or chafing against hoistway or equipment within hoistway.
    - a. Provide five pair of shielded wires of minimum 18-gauge for card reader.
    - b. Provide eight pair of spare shielded communication wires in addition to those required to connect specified items.
    - c. Tag spares in equipment space. Provide cables from controller to car top.
  4. Auxiliary Wiring: Provide conduit, wiring and connections for fire alarm initiating devices, emergency two-way communication system, and announcement speaker equipment space junction box to each car controller in equipment space.
  
- K. Entrance Equipment:
  1. Door Hangers: Two-point hanger roller with neoprene roller surface and suspension with eccentric upthrust roller adjustment.
  2. Door Tracks: Bar or formed, cold-drawn removable steel tracks with smooth roller contact surface.
  3. Door Interlocks: Operable without retiring cam. Paint interlock box flat black.
  4. Door Closers: Spring, spirator, or jamb/strut mounted counterweight type. Design and adjust to insure smooth, quiet mechanical close of doors.
  
- L. Floor Numbers: Stencil paint 4" high floor designations in contrasting color on inside face of hoistway doors and hoistway fascia visible from within car.

## 2.8 HOISTWAY ENTRANCES

- A. Complete entrances bearing fire labels from a certified testing laboratory approved by authority having jurisdiction.
  
- B. Frames: 14-gauge hollow metal at all floors. Bolted and lapped head to jamb assembly at all floors. Provide Arabic floor designation/Braille plates, centered at 60" above finished floor, on both side jambs of all entrances. Provide plates at main egress landing with "Star" designation. For designated emergency car, provide "Star of Life" cast designation plates at height of 78"-84" above finished floor on both side jambs at all floors. Braille indications shall be below Arabic floor designation. Provide cast floor designation/Braille plates as manufactured by SCS Elevator Products, Inc. with permanent rear fasteners.

- C. Door Panels: 16-gauge steel, formed construction without binder angles. Provide leading edges of center-opening doors with rubber astragals. Provide a minimum of two gibs per panel, one at leading and one at trailing edge with gibs in the sill groove entire length of door travel. Construct door panels with interlocking, stiffening ribs.
- D. Sight Guards: 14-gauge, same material and finish as hoistway entrance door panels. Construct without sharp edges.
- E. Sills: Extruded aluminum.
- F. Sill Supports: Structural or formed steel designed to support door sill based upon car loading classification. Mount to eliminate need for grout under the sill.
- G. Fascia, Toe Guards and Hanger Covers: 14-gauge furniture steel with Contractor's standard finish.
- H. Struts and Headers: Provide all support of entrances and related material to building structure. Provide door open bumpers on entrances equipped with vertical struts.
- I. Elevator Identification Signage: Provide alpha-numerical car label at designated floor. Provide metal plate, finish to match designated fixture finish.
- J. Finish of Frames and Doors: Satin finish stainless steel. Provide final painting requirements to General Contractor where factory prime finish is specified.
- K. Hoistway Access:
  - 1. Hoistway Door Unlocking Device: Provide unlocking device with locking escutcheon in door panel at all floors, with finish to match adjacent surface.
  - 2. Hoistway Access Switches: Mount in entrance frame side jamb at top and bottom floors. Provide switch faceplate.

## 2.9 CAR EQUIPMENT

- A. Frame: Welded or bolted, rolled or formed steel channel construction to meet load classification specified.
- B. Safety Device: Type "B," flexible guide clamp.
- C. Platform: Isolated type, constructed of steel, or steel and wood that is fireproofed on underside. Design and construct to accommodate load classification requirements. Provide Class "A" construction for passenger elevators.
- D. Platform Apron: Minimum 14-gauge steel, reinforced and braced to car platform front and rear with Manufacturer's standard finish.
- E. Guide Shoes: Roller type with three or more spring dampened, sound-deadening rollers per shoe.
- F. Finish Floor Covering: Furnished under other sections.
  - 1. Passenger Car: Accommodate a minimum 1" tile floor thickness.
- G. Sills: One-piece aluminum extrusion with extruded extension between car entrance columns to face of car front return. Extruded extension to match finish of sill.

- H. Door Panels: 16-gauge steel, formed construction without binder angles. Provide leading edges of center-opening doors with rubber astragals. Provide a minimum of two gibs per panel, one at leading and one at trailing edge with gibs in the sill groove entire length of door travel. Construct door panels with interlocking, stiffening ribs.
- I. Door Hangers: Two-point suspension. Hanger roller with non-metallic surface and eccentric roller adjustment.
- J. Door Track: Bar or formed, cold-drawn removable steel track with smooth roller contact surface.
- K. Door Header: Construct of minimum 12-gauge steel, shape to provide stiffening flanges.
- L. Door Electrical Contact: Prohibit car operation unless car door is closed. Provide car door interlock to prevent opening of car doors outside the unlocking zone.
- M. Door Clutch: Heavy-duty clutch, linkage arms, vane assembly and pickup rollers or cams to provide positive, smooth, quiet door operation. Design clutch so car doors can be closed, with hoistway doors open.
- N. Restricted Opening Device: Provide mechanical car-door restrictor to prevent opening of doors when outside unlocking zone.
- O. Door Operator: High speed, heavy-duty door operator capable of opening doors at no less than 2.5 f.p.s. Accomplish reversal in no more than 2½" of door movement. Provide solid-state door control with closed loop circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. Provide a minimum of four controller-based motion profiles, per floor, per door, to maintain consistent, smooth, and quiet door operation at all floors, regardless of door weight or varying air pressure.
- P. Door Reversing Device:
  - 1. Infrared Reopening Device:
    - a. Black fully enclosed device with full screen infrared matrix or multiple beams extending vertically along leading edge of each door panel to minimum height of 7'-0" above finished floor. Device shall prevent doors from closing and reverse doors at normal opening speed if beams are obstructed while doors are closing, except during nudging operation. In event of device failure, provide for automatic shutdown of car at floor level with doors open.
  - 2. Nudging Operation: After beams of door control device are obstructed for a predetermined time interval (minimum 20.0-25.0 seconds), warning signal shall sound and doors shall attempt to close with a maximum of 2.5 foot-pounds kinetic energy. Activation of the door open button shall override nudging operation and reopen doors.
  - 3. Interrupted Beam Time: When beams are interrupted during initial door opening, hold door open a minimum of 3.0 seconds. When beams are interrupted after the initial 3.0 second hold open time, reduce time doors remain open to an adjustable time of approximately 1.0-1.5 seconds after beams are reestablished.
  - 4. Differential Door Time: Provide separately adjustable timers to vary time that doors remain open after stopping in response to calls.
    - a. Car Call: Hold open time adjustable between 3.0 and 5.0 seconds.
    - b. Hall Call: Hold open time adjustable between 5.0 and 8.0 seconds. Use hall call time when car responds to coincidental calls.
- Q. Car Operating Panel- Main and auxiliary:
  - 1. 'No Smoking' engraving
  - 2. Engraved elevator number
  - 3. Emergency light

4. Firefighter Hat jewel
5. Firefighters cabinet ( Keys FEOK-1'S). To include:
  - a. Hat
  - b. Call cancel
  - c. Door open
  - d. Door close
  - e. Run/ Stop
  - f. Two (2) spares
6. 1/8" high vandal resistant SS buttons with halo
7. Door open
8. Door close
9. Alarm button
10. "Help" button, with 'when lit help is on its way' engraving
11. Hands free emergency two way phone with speaker pattern
12. Attendants Cabinet. To include:
  - a. Light keyswitch, on/ off
  - b. Fan keyswitch, off/ low/ high
  - c. Access enable, on/ off
  - d. Inspection, on/ off
  - e. Cab overload jewel
  - f. Emergency light test button
  - g. GFCI
  - h. Two spares
13. Capacity engraving
14. Certification window

R. Car Top Control Station: Mount to provide safe access and utilization while standing on car top.

S. Work Light and Duplex Plug Receptacle: GFCI protected outlet at top and bottom of car. Include on/off switch and lamp guard.

T. Communication System:

1. Two-way communication instrument in car with automatic dialing, tracking, and recall features, with shielded wiring to car controller in equipment space. Provide dialer with automatic rollover capability with minimum two numbers.
  - a. Actuate two-way communication via "Help" button.
  - b. Button or adjacent light jewel shall illuminate and flash when call is acknowledged.
  - c. Button shall match car operating panel pushbutton design.
  - d. Provide "Help" button tactile symbol, engraved signage, and Braille adjacent to button mounted integral with car front return panel.
2. Provide two-way communication between car and equipment space if required.

## 2.10 CAR ENCLOSURE

A. Passenger Elevator: Provide complete as specified herein and reference Allowance section.

1. Shell: Reinforced furniture steel formed panels with baked enamel interior finish as selected. Apply sound-deadening mastic to exterior. Provide concealed ventilation cutouts.
2. Canopy: Reinforced furniture steel formed panels with lockable, contacted, hinged emergency exit. Interior finish white reflective baked enamel.
3. Front and Rear Return Panels: Reinforced furniture satin stainless steel with minimum with cutouts for applied car operating panels and other equipment.
4. Transom: Reinforced furniture steel clad with minimum satin stainless steel full width of enclosure.
5. Car Door Panels: Reinforced minimum furniture satin stainless steel. Same construction as hoistway door panels.
6. Base: Stainless steel with concealed ventilation cutouts.

7. Interior Wall Finish: Include allowance of \$10,000 and 1000 lbs. for interior car finishes.
8. Lighting: Provide LED fixtures with wiring and hookup. Coordinate with emergency lighting requirements.
9. Suspended Ceiling: Six-section satin finish stainless steel panels with lighting cutouts in each panel.
10. Handrails: Minimum 1¼" diameter aluminum tubular grab bar with backing plates and captive nuts across side walls. Bolt rails through car walls from back and mount on 1½" deep solid round stainless steel standoff spacers no more than 18" O.C. Return handrail/guardrail ends to car walls.
11. Pads and Buttons: Three-piece removable pads. Two pads covering side walls and adjacent front returns and one covering rear wall. Provide cutouts to access main car operating panel.

#### 2.11 HALL CONTROL STATIONS

- A. Pushbuttons: Provide two risers with flush mounted faceplates. Include pushbuttons for each direction of travel that illuminate to indicate call registration. Include approved engraved message and pictorial representation prohibiting use of elevator during fire or other emergency on separate engraved plate. Pushbutton design shall match car operating panel pushbuttons. Provide vandal resistant pushbutton and light assemblies. Provide LED illumination.
- B. Phase I Fire Service fixture, including keyswitch, engraved operating instructions and illuminating jewel..
- C. Provide buttons integral with hall control station. Pushbutton design shall match car operating panel pushbuttons.

#### 2.12 SIGNALS

- A. Car Direction Lantern:
  1. Provide at each entrance to indicate travel direction of arriving car. Locate as detailed on architectural drawings.
  2. Illuminate up or down LED lights and sound tone once for up and twice for down direction. Illuminate light until the car doors start to close and as doors open.
  3. Sound level shall be adjustable from 20-80 dBA measured at 5'-0" in front of hall control station and 3'-0" off floor.
  4. Car direction lenses shall be arrow shaped with faceplates.
  5. Lenses shall be minimum 2½" in their smallest dimension.
- B. Car Position Indicator: Alpha-numeric digital indicator containing floor designations and direction arrows a minimum of 1/2" high to indicate floor served and direction of car travel. Locate fixture in car front return panels. When a car leaves or passes a floor, illuminate indication representing position of car in hoistway. Illuminate proper direction arrow to indicate direction of travel.
- C. Faceplate Material and Finish: Satin finish stainless steel, all fixtures. Tamper resistant fasteners for all fastenings exposed to the public.
- D. Floor Passing Tone: Provide an audible tone of no less than 20 decibels and frequency of no higher than 1500 Hz, to sound as the car passes or stops at a floor served.
- E. Firefighters' Key Box: Flush-mounted box with lockable hinged cover. Engrave instructions for use on cover per Local Fire Authority requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Prior to beginning installation of equipment examine hoistway and equipment space areas to verify elevator system design requirements have been met.
- B. It is the Contractor's responsibility to coordinate installation of sleeves, block outs, elevator equipment with integral anchors, machine beam, and other items that are embedded or placed on concrete or masonry needed for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, machine beams, and installation instructions and deliver to Project site in time for installation.
- C. It is also the responsibility of the Contractor to coordinate the integration of the elevator systems with the other building trades, including, but not limited to: pit ladders; sumps; floor drains; entrance sills; electrical service, outlets, lights, and switches; beams; HVAC positioning; smoke detector positioning, car reader, and security provisions
- D. Provide all required staging, protection, hoisting, hoist/safety beams, and equipment necessary for the movement of equipment. It can be assumed that storage space at the site will be limited. If any additional off site space is required, the cost is the responsibility of the Contractor.
- E. Do not proceed with installation until work in place conforms to project requirements.

### 3.2 DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in Contractor's original unopened protective packaging.
- B. Store material in original protective packaging. Prevent soiling, physical damage, or moisture damage.
- C. Protect equipment and exposed finishes from damage and stains during transportation and construction.

### 3.3 INSTALLATION

- A. Install all equipment in accordance with Contractor's instructions, referenced codes, specification, and approved submittals.
- B. Install equipment space equipment with clearances in accordance with referenced codes and specification.
- C. Install all equipment so it may be easily removed for maintenance and repair.
- D. Provide any required hoisting/safety beams. Remove if beams are encroaching on code clearances prior to final acceptance.
- E. Install all equipment to afford maximum accessibility, safety, and continuity of operation.
- F. Remove oil, grease, scale, and other foreign matter from all equipment and apply one coat of field-applied machinery enamel for all equipment and metal work installed that does not have a factory applied paint or architectural finish. Neatly touch up damaged factory-painted surfaces with original paint color to protect factory finished surfaces against corrosion.

- G. Fill hoistway door frames, back boxes for hallway stations and signal devices, and sills.
- H. Clean all architectural finishes and replace or restore any surfaces damaged during construction to like new condition.

#### 3.4 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.
- C. Independent Testing by Owner's Consultant:

#### 3.5 ERECTION TOLERANCES

- A. Install rails plumb and align vertically with tolerance of 1/16" in 100'-0". Secure joints without gaps and file any irregularities to a smooth surface.

#### 3.6 ADJUSTING

- A. Static balance car to equalize pressure of guide shoes on guide rails. Dynamically balance car and counterweight.
- B. Lubricate all equipment in accordance with Contractor's instructions.
- C. Adjust motors, power conversion units, brakes, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks, and safety devices to achieve specified performance levels.

#### 3.7 CLEANING

- A. Keep work areas orderly and free from debris during progress of project. Remove packaging materials on a daily basis.
- B. Remove all loose materials and filings resulting from work.
- C. Clean equipment space equipment and floor.
- D. Clean hoistways, car, car enclosure, entrances, operating and signal fixtures.
- E. Clean pit equipment and floor.

#### 3.8 DEMONSTRATION:

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevators.



- B. Check operation of each elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

### 3.9 PROTECTION

- A. The elevators shall not be used for construction purposes without authorization from the Owner. Should the elevators be authorized for temporary use, the following conditions shall apply:
  - 1. The Contractor shall provide a temporary acceptance form for the user to sign.
  - 2. Neither the warranty or maintenance period shall start at this time unless specifically approved in writing by the Owner.
  - 3. The user shall provide, if job conditions require, all temporary enclosures, guards or other protection of all installed equipment.
  - 4. The user shall return the elevators in the same condition they were in when placed on temporary service and shall pay the Elevator Contractor for maintenance, repairs or clean up.
  - 5. The cost of temporary service shall not be charged to the Owner.
  
- B. As elevators are completed, the Owner shall have the prerogative of accepting and using them, shutting them down, or accepting them under an Interim Service Agreement described below:
  - 1. The Owner shall have the prerogative of continuing the Interim Service Agreement until all elevators in the group (or building) are completed.
  - 2. The warranty period will start at the termination of the Interim Service Agreement period.
  - 3. The cost of Interim Service shall not exceed the prorated cost of the monthly maintenance bid required by these specifications.
  
- C. Temporary Use: with the following requirements for each elevator used for construction purposes:
  - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
  - 2. Provide strippable protective film on entrance and car doors and frames.
  - 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
  - 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
  - 5. Do not load elevators beyond their rated weight capacity.
  - 6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
  - 7. Engage Elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items which cannot be refinished in the field to the shop, make required repairs, and refinish entire unit, or provide new units as required.

END OF SECTION