

SECTION 14 12 11  
ELECTRIC DUMBWAITER  
GEARED TRACTION AND WINDING DRUM

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the engineering, furnishing, and installation of the complete electric traction dumbwaiter system as described herein and indicated on the drawings.
- B. Items listed in the singular apply to each and every dumbwaiter in this specification except where noted.
- C. The Dumbwaiter shall be winding drum, microprocessor controller, AC VVVF motor control, with central station dispatching, signal system, car leveling device, manually operated car and hoistway doors.

**1.2 RELATED WORK**

- A. Section 01 33 23 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- B. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-rated construction.
- C. SECTION 09 06 00, SCHEDULE FOR FINISHES: As a master format for construction projects, to identify interior and exterior material finishes for type, texture, patterns, color and placement.
- D. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section.
- E. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.
- F. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- G. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for cables and wiring.
- H. Section 26 05 71, ELECTRICAL SYSTEM PROTECTIVE DEVICE STUDY: Requirements for installing the over-current protective devices to ensure proper equipment and personnel protection.
- I. Section 26 22 00, LOW-VOLTAGE TRANSFORMERS: Low voltage transformers.

### **1.3 QUALIFICATIONS**

- A. Approval by the Contracting Officer is required for products or services of proposed manufacturers, suppliers, and installers and shall be contingent upon submission by Contractor of a certificate stating the following:
1. Elevator contractor is currently and regularly engaged in the installation of elevator equipment as one of his principal products.
  2. Elevator contractor shall have three years of successful experience, trained supervisory personnel, and facilities to install elevator equipment specified herein.
  3. The installers shall be Certified Elevator Mechanics with technical qualifications of at least five years of successful experience and Apprentices actively pursuing certified mechanic status.  
Certificates are required for all workers employed in this capacity.
  4. Elevator contractor shall submit a list of two or more prior hospital installations where all the dumbwaiter equipment he proposes to furnish for this project has performed satisfactorily under conditions of normal hospital use. Provide a list of hospitals that have the equipment in operation for two years preceding the date of this specification. Provide the names and addresses of the Medical Centers and the names and telephone numbers of the Medical Center Administrators.
- B. Approval of Elevator Contractor's equipment will be contingent upon their identifying an elevator maintenance service provider that shall render services within one hour of receipt of notification, together with certification that the quantity and quality of replacement parts stock is sufficient to warranty continued operation of the elevator installation.
- C. Approval will not be given to elevator contractors and manufacturers who have established on prior projects, either government, municipal, or commercial, a record for unsatisfactory elevator installations, have failed to complete awarded contracts within the contract period, and does not have the requisite record of satisfactorily performing dumbwaiter installations of similar type and magnitude.
- D. All electric traction dumbwaiters shall be the product of the same manufacturer.

- E. The Contractor shall provide and install only those types of safety devices that have been subjected to tests witnessed and certified by an independent professional testing laboratory that is not a subsidiary of the firm that manufactures supplies or installs the equipment.
- F. Welding at the project site shall be made by welders and welding operators who have previously qualified by test as prescribed in American Welding Society Publications AWS D1.1 to perform the type of work required. VAMC shall require welding certificates be submitted for all workers employed in this capacity. A welding or hot work permit is required for each day and shall be obtained from the VA COR of safety department. Request permit one day in advance.

**1.4 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification. Dumbwaiter installation shall meet the requirements of the latest editions published and adopted by the United States Department of Veterans Affairs on the date contract is signed.
- B. Federal Specifications (Fed. Spec.):
  - J-C-30B.....Cable and Wire, Electrical (Power, Fixed Installation)
  - W-C-596F.....Connector, Plug, Electrical; Connector, Receptacle, Electrical
  - W-F-406E.....Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible
  - HH-I-558C.....Insulation, Blankets, Thermal (Mineral Fiber, Industrial Type)
  - W-F-408E.....Fittings for Conduit, Metal, Rigid (Thick- Wall and Thin-wall (EMT) Type)
  - RR-W-410.....Wire Rope and Strand
  - TT-E-489J.....Enamel, Alkyd, Gloss, Low VOC Content
  - QQ-S-766 .....Steel, Stainless and Heat Resisting, Alloys, Plate, Sheet and Strip
- C. International Building Code (IBC)
- D. American Society of Mechanical Engineers (ASME):
  - A17.1.....Safety Code for Elevators and Escalators
  - A17.2.....Inspectors Manual for Electric Elevators and Escalators

E. National Fire Protection Association:

NFPA 13.....Standard for the Installation of Sprinkler Systems

NFPA 70.....National Electrical Code (NEC)

NFPA 72.....National Fire Alarm and Signaling Code

NFPA 101.....Life Safety Code

NFPA 252.....Fire Test of Door Assemblies

F. American Society for Testing and Materials (ASTM):

A1008/A1008M-09.....Steel, Sheet, Cold Rolled, Carbon, Structural,  
High-Strength Low-Alloy and High Strength Low-  
Alloy with Improved Formability

E1042-02.....Acoustically Absorptive Materials Applied by  
Trowel or Spray

G. Gauges:

For Sheet and Plate: U.S. Standard (USS)

For Wire: American Wire Gauge (AWG)

H. American Welding Society (AWS):

D1.1.....Structured Welding Code Steel

I. National Electrical Manufacturers Association (NEMA):

LD-3.....High-Pressure Decorative Laminates

J. Underwriter's Laboratories (UL):

486A.....Safety Wire Connectors for Copper Conductors

797.....Safety Electrical Metallic Tubing

K. Institute of Electrical and Electronic Engineers (IEEE)

**1.5 SUBMITTALS**

A. Submit in accordance with Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Before execution of work, furnish information to evidence full compliance with contract requirements for proposed items. Such information shall include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity, and rating) and corresponding specification reference (Federal or project specification number and paragraph). All submitted drawings and related dumbwaiter material shall be forwarded to the Contracting Officer.

C. Shop Drawings:

1. Complete scaled and dimensioned layout in plan and section view showing the arrangement of equipment and all details of each and every dumbwaiter unit specified including:
    - a. Hoisting machines, controllers, power conversion devices, governors, and all other components located in machine room.
    - b. Car, counterweight, sheaves, supporting beams, guide rails, brackets, buffers, size of car platform, car frame members, and other components located in hoistway.
    - c. Rail bracket spacing and maximum vertical forces on guide rails in accordance with ASME A17.1 Section 2.23 and Section 8.4.8
    - d. Reactions at points of supports and buffer impact loads.
    - e. Weights of principal parts.
    - f. Top and bottom clearances and over travel of car and counterweight.
    - g. Location of shunt trip circuit breaker, switchboard panel, light switch, and feeder extension points in the machine room.
  2. Drawings of hoistway entrances and doors showing details of construction and method of fastening to the structural members of the building.
    - a. If drywall construction is used to enclose hoistway, submit details of interface fastenings between entrance frames and drywall.
    - b. Sill details including sill support.
- D. Samples:
1. One each of stainless steel, 75 mm x 125 mm (3 in. x 5 in.).
  2. One each hall button sample.
  3. One each hall lantern/position indicator sample.
  4. One each wall and ceiling material finish sample.
  5. One each car lighting sample.
  7. No other samples of materials specified shall be submitted unless specifically requested after submission of manufacturer's name. If additional samples are furnished pursuant to request, adjustment in contract price and time will be made as provided in Section 00 72 00, GENERAL CONDITIONS.
- E. Name of manufacturer, type or style designation, and applicable data of the following equipment shall be shown on the dumbwaiter layouts:

1. Hoisting machine.
  2. Hoisting machine motor, HP rating, and RPM.
  3. Controller
  4. Starters and overload current protection devices.
  5. Car and counterweight safety devices; maximum and minimum rated loads and rated speeds.
  6. Hoistway door interlocks.
  7. Car and counterweight buffers; maximum and minimum rated loads, maximum rated striking speed and stroke.
  8. Hoist ropes; ultimate breaking strength, allowable working load, and actual working load.
- F. Complete construction drawings of dumbwaiter enclosure, showing dimensioned details of construction, fastenings to platform, car lighting, and location of car equipment.
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- G. Dimensioned drawings showing details of:
1. All signal and operating fixtures.
  2. Car and counterweight slide guides.
  3. Hoistway door tracks, hangers, and sills.
- H. Cuts or drawings showing details of controller.
- I. Furnish certificates as required under: Paragraph "QUALIFICATIONS".

#### **1.6 WIRING DIAGRAMS**

- A. Provide three complete sets of field wiring and straight line wiring diagrams showing all electrical circuits in the hoistway, machine room and fixtures. Install one set coated with an approved plastic sealer and mounted in the dumbwaiter machine room as directed by the VA COR.
- B. In the event field modifications are necessary during installation, diagrams shall be revised to include all corrections made prior to and during the final inspection. Corrected diagrams shall be delivered to the VA COR within 30 days of final acceptance.
- C. Provide the following information relating to the specific type of microprocessor controls installed:
  1. Owner's information manual, containing job specific data on major components, maintenance, and adjustment.
  2. System logic description.

3. Complete wiring diagrams needed for field troubleshooting, adjustment, repair and replacement of components. Diagrams shall be base diagrams, containing all changes and additions made to the equipment during the design and construction period.
4. Changes made during the warranty period shall be noted on the drawings in adequate time to have the finalized drawings reproduced for mounting in the machine room no later than six months prior to the expiration of the warranty period.

**1.7 ADDITIONAL EQUIPMENT**

- A. Additional equipment required to operate the specified equipment manufactured and supplied for this installation shall be furnished and installed by the contractor. The cost of the equipment shall be included in the base bid.
- B. Special equipment not required by specification, which would improve the operation, may be installed in conjunction with the specified equipment by the contractor at his option at no additional cost to the Government, provided prior approval is obtained from the Contracting Officer's Technical Representative.

**1.8 PERFORMANCE STANDARDS**

- A. The dumbwaiter shall meet the highest standards of the industry and specifically the following:
  1. Contract speed is high speed in either direction of travel with rated capacity load in the dumbwaiter. Speed variation under all load conditions, regardless of direction of travel, shall not vary more than three (3) percent.
  2. The controlled rate of change of acceleration and retardation of the car shall not exceed 0.1G per second and the maximum acceleration and retardation shall not exceed 0.2G per second.
  3. Starting, stopping, and leveling shall be smooth without appreciable steps of acceleration and deceleration.
- B. Dumbwaiter control system shall be capable of starting the car without noticeable "roll-back" of hoisting machine sheave, regardless of load condition in car, location of car, or direction of travel.
- C. Floor level stopping accuracy shall be within 3 mm (1/8 in.) above or below the floor, regardless of load condition.

- D. Noise and Vibration Isolation: All dumbwaiter equipment including their supports and fastenings to the building, shall be mechanically and electrically isolated from the building structure to minimize objectionable noise and vibration transmission to car, building structure, or adjacent occupied areas of building.
- E. Sound Isolation: Noise level relating to dumbwaiter equipment operation in machine room shall not exceed 80 dBA. All dBA readings shall be taken three (3) feet off the floor and three (3) feet from equipment.
- F. Airborne Noise: Measured noise level of dumbwaiter equipment during operation shall not exceed 50 dBA in dumbwaiter lobbies under any condition including door operation.

#### **1.9 WARRANTY**

- A. Submit all labor and materials furnished in connection with dumbwaiter system and installation to terms of "Warranty of Construction" articles of FAR clause 52.246-21. The One Year Warranty shall commence after final inspection, completion of performance test, and upon full acceptance of the installation and shall concur with the guarantee period of service.
- B. During warranty period if a device is not functioning properly or in accordance with specification requirements, or if in the opinion of the Contracting Officer's Technical Representative, excessive maintenance and attention must be employed to keep device operational, device shall be removed and a new device meeting all requirements shall be installed as part of work until satisfactory operation of installation is obtained. Period of warranty shall start anew for such parts from date of completion of each new installation performed, in accordance with foregoing requirements.

#### **PART 2 - PRODUCTS**

##### **2.1 MATERIALS**

- A. Where stainless steel is specified, it shall be corrosion resisting steel complying with Federal Specification QQ-S-766, Class 302 or 304, Condition A with Number 4 finish on exposed surfaces. Stainless steel shall have the grain of belting in the direction of the longest dimension and surfaces shall be smooth and without waves. During installation all stainless steel surfaces shall be protected with suitable material.

- B. Where cold rolled steel is specified, it shall be low-carbon steel rolled to stretcher leveled standard flatness, complying with ASTM A109.

## **2.2 MANUFACTURED PRODUCTS**

- A. Materials, devices and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items. Items not meeting this requirement but meet technical specifications, which can be established through reliable test reports or physical examination of representative samples will be considered.
- B. When two or more devices of same class of materials or equipment are required, these devices shall be products of one manufacturer.
- C. Manufacturers of equipment assemblies which include components made by others shall assume complete responsibility for the final assembled unit.
1. Individual components of an assembled unit shall be products of same manufacturer.
  2. Parts which are alike shall be the product of a single manufacturer.
  3. Components shall be compatible with each other and with the total assembly for the intended service.
- D. Motor nameplates shall state manufacturer's name, rated horsepower, speed, volts, amperes, and other characteristics required by NEMA Standards, and be securely attached to the item of equipment in a conspicuous location.
- E. The dumbwaiter equipment, including controllers, door operators, and supervisory system shall be the product of manufacturers of established reputation, provided such items are capably engineered and produced under coordinated specifications to ensure a first class, safe and smooth operating system. Mixing of manufactures related to a single system or group of components shall be identified in the submittals.
- F. Where key operated switches are furnished in conjunction with any component of this dumbwaiter installation, furnish four (4) keys for each individual switch or lock. Provide different key tumblers for different switch and lock functions. Each and every key shall have a tag bearing a stamped or etched legend identifying its purpose. Barrel key switches are not acceptable, except where required by code.

G. If the dumbwaiter equipment to be installed is not known to the VA COR, the Contractor shall submit drawings in triplicate for approval to the VA COR, Contracting Officer, and VA CFM Elevator Engineer showing all details and demonstrate that the equipment to be installed is in strict accordance with the specifications.

**2.3 CAPACITY, SIZE, SPEED, AND TRAVEL**

A. Each dumbwaiter shall have the capacity to lift the live load, including the weight of car and cables, at the speed specified in the following schedule:

DUMBWAITER SCHEDULE	
Dumbwaiter Number	1
Overall Platform Size	24"W x 24"D x 36"H
Rated Load - kg(lb)	200 LBS
Contract Speed - m/s(fpm)	50 FPM
Total Travel - m/s(fpm)	12'-6"
Number of Stops	2
Number of Openings	2
Type of Roping	Wire
Entrance Size and Type	24" W x 36" H

**2.4 POWER SUPPLY**

- A. For power supply in each machine room see Specification 26 05 19, ELECTRICAL and Electrical drawings.
- B. It shall be the Electrical contractor's responsibility to supply the labor and materials for the installation of the following:
  - 1. Feeders from the power source indicated on the drawings to each dumbwaiter controller.
  - 2. Shunt Trip Circuit Breaker for each controller shall be located inside machine room at the strike side of the machine room door and lockable in the "Off" position.
  - 3. Provide Surge Suppressors to protect the dumbwaiter equipment.

- C. Power for auxiliary operation of dumbwaiter as specified shall be available from auxiliary power generator, including wiring connection to the dumbwaiter control system.

## **2.5 CONDUIT AND WIREWAY**

- A. Unless otherwise specified or approved, install electrical conductors, except traveling cable connections to the car, in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing or metal wireways. Rigid conduit smaller than 3/4 inch or electrical metallic tubing smaller than 1/2 inch electrical trade size shall not be used. All raceways completely embedded in concrete slabs, walls, or floor fill shall be rigid steel conduit. Wireway (duct) shall be installed in the hoistway and to the controller and between similar apparatus in the dumbwaiter machine room. Fully protect self-supporting connections, where approved, from abrasion or other mechanical injury. Hospital grade flexible metal conduit not less than 3/8 inch electrical trade size may be used, not exceeding 18 inches in length unsupported, for short connections between risers and limit switches, interlocks, and for other applications permitted by NEC.
- B. All conduit terminating in steel cabinets, junction boxes, wireways, switch boxes, outlet boxes and similar locations shall have approved insulation bushings. Install a steel lock nut under the bushings if they are constructed completely of insulating materials. Protect the conductors at ends of conduits not terminating in steel cabinets or boxes by terminal fittings having an insulated opening for the conductors.
- C. Rigid conduit and EMT fittings and connectors using set screws or indentations as a means of attachment shall not be used. All fittings shall be steel or malleable iron.
- D. Connect motors or other items subject to movement, vibration or removal to the conduit or EMT systems with flexible, steel conduits.

## **2.6 CONDUCTORS**

- A. Unless otherwise specified, conductors, excluding the traveling cables, shall be stranded or solid coated annealed copper in accordance with Federal Specification J-C-30B for Type RHW or THW. Where 16 and 18 AWG are permitted by NEC, single conductors or multiple conductor cables in accordance with Federal Specification J-C-580 for Type TF may be used

provided the insulation of single conductor cable and outer jacket of multiple conductor cable is flame retardant and moisture resistant. Multiple conductor cable shall have color or number coding for each conductor. Conductors for control boards shall be in accordance with NEC. Joints or splices are not permitted in wiring except at outlets. Tap connectors may be used in wireways provided they meet all UL requirements.

- B. Provide all conduit and wiring between machine room, hoistway and fixtures.
- C. All wiring must test free from short circuits or grounds. Insulation resistance between individual external conductors and between conductors and ground shall be a minimum of one megohm.
- D. Where size of conductor is not given, voltage and amperes shall not exceed limits prescribed by NEC.
- E. Provide equipment grounding. Ground the conduits, supports, controller enclosure, motor, platform and car frame, and all other non-current conducting metal enclosures for electrical equipment in accordance with NEC. The ground wires shall be copper, green insulated, and sized as required by NEC. Bond the grounding wires to all junction boxes, cabinets, and wire raceways.
- F. Terminal connections for all conductors used for external wiring between various items of dumbwaiter equipment shall be solderless pressure wire connectors in accordance with Federal Specification W-S-610. The Contractor may, at his option, make these terminal connections on 10 gauge or smaller conductors with approved terminal eyelets set on the conductor with a special setting tool, or with an approved pressure type terminal block. Terminal blocks using pierce-through serrated washers are not acceptable.

## **2.7 TRAVELING CABLES**

- A. All conductors to the car shall consist of flexible traveling cables conforming to the requirements of NEC. Traveling cables shall run from the junction box on the car directly to the controller. Junction boxes on the car shall be equipped with terminal blocks. Terminal blocks having pressure wire connectors of the clamp type that meet UL 486A requirements for stranded wire may be used in lieu of terminal eyelet connections. Terminal blocks shall have permanent indelible identifying

numbers for each connection. Cables shall be securely anchored to avoid strain on individual terminal connections. Flame and moisture resistant outer covering must remain intact between junction boxes. Abrupt bending, twisting and distortion of the cables shall not be permitted.

- B. Provide spare conductors equal to 10 percent of the total number of conductors furnished, but not less than 5 spare conductors in each traveling cable.
- C. If traveling cables come into contact with the hoistway or dumbwaiter due to sway or change in position, provide shields or pads to the dumbwaiter and hoistway to prevent damage to the traveling cables.
- D. Hardware cloth may be installed from the hoistway suspension point downward to the dumbwaiter pit to prevent traveling cables from rubbing or chafing. Hardware cloth shall be securely fastened and tensioned to prevent buckling. Hardware cloth is not required when traveling cable is hung against a flat wall.

## **2.8 CONTROLLER**

- A. UL/CSA Labeled Controller: Mount all assemblies, power supplies, chassis switches, and relays on a self-supporting steel frame. Completely enclose the equipment and provide a mean to control the temperature. Solid state components shall be designed to operate between 32 to 104 degrees Fahrenheit, humidity non-condensing up to 85 percent.
- B. All controller switches and relays shall have contacts of design and material to insure maximum conductivity, long life and reliable operation without overheating or excessive wear, and shall provide a wiping action to prevent sticking due to fusion. Switches carrying highly inductive currents shall be provided with arc shields or suppressors.
- C. Where time delay relays are used in the circuits, they shall be of an acceptable design that is adjustable, reliable, and consistent such as condenser timing or electronic timing circuits.
- D. Properly identify each device on all panels by name, letter, or standard symbol which shall be neatly stencil painted or decaled in an indelible and legible manner. Identification markings shall be coordinated with identical markings used on wiring diagrams. The ampere

rating shall be marked adjacent to all fuse holders. All spare conductors to controller shall be neatly formed, laced, and identified.

## **2.9 MICROPROCESSOR CONTROL SYSTEM**

- A. Provide a microprocessor based system with absolute position/speed feedback encoded tape to control the hoisting machine and signal functions in accordance with these specifications. Complete details of the components and printed circuit boards, together with a complete operational description, shall be submitted for approval.
  - 1. All controllers shall be non-proprietary.
  - 2. Proprietary tools shall not be necessary for adjusting, maintenance, repair, and testing of equipment.
  - 3. Controller manufacturer shall provide factory training, engineering and technical support, including all manuals and wiring diagrams to the VA Medical Center's designated Elevator Maintenance Service Provider.
  - 4. Replacement parts shall be shipped overnight within 48 hours of an order being received.
- B. All controller assemblies shall provide smooth, step-less acceleration and deceleration of the dumbwaiter automatically and irrespective of the load in the car. All control equipment shall be enclosed in metal cabinets with lockable, hinged door(s) and shall be provided with a means of ventilation. All non-conducting metal parts in the machine room shall be grounded in accordance with NEC. Cabinet shall be securely attached to the building structure.
- C. Circuit boards for the control of each and every dumbwaiter system; dispatching, signals, door operation and special operation shall be installed in a NEMA Type 1 General Purpose Enclosure. Circuit boards shall be moisture resistant, non-corrosive, non-conductive, fabricated of non-combustible material and adequate thickness to support the components mounted thereon. Mounting racks shall be spaced to prevent accidental contact between individual circuit boards and modules.
- D. Modules shall be the type that plug into pre-wired mounting racks. Field wiring or alternation shall not be necessary in order to replace defective modules.
- E. Each device, module and fuse (with ampere rating) shall be identified by name, letter or standard symbol in an approved indelible and legible

manner on the device or panel. Coordinate identification markings with identical markings on wiring diagrams.

- F. The electrical connections between the printed circuit boards (modules) and the circuit connectors incorporated in the mounting racks shall be made through individual tabs which shall be an integral part of each module. The tabs shall be nickel-gold plated or other approved metal of equal electrical characteristics. Modules shall be keyed or notched to prevent insertion of the modules in the inverted position.
- G. Light emitting diodes (LED) shall be for visual monitoring of individual modules.
- H. Components shall have interlocking circuits to assure fail-safe operation and to prevent dumbwaiter movement should a component malfunction.
- I. Method of wire wrapping from point to point with connections on the mounting racks shall be submitted for approval.
- J. Field wiring changes required during construction shall be made only to the mounting rack connection points and not to the individual module circuitry or components. If it becomes necessary to alter individual modules they shall be returned to the factory where design changes shall be made and module design records changed so correct replacement units will be available.
- K. All logic symbols and circuitry designations shall be in accordance with ASME and NEC Standards.
- L. Solid state components shall be designed to operate within a temperature range of 32 to 104 degrees Fahrenheit, humidity non-condensing up to 85 percent.
- M. Wiring connections for operating circuits and for external control circuits shall be brought to terminal blocks mounted in an accessible location within the controller cabinet. Terminal blocks using pierce through serrated washers shall not be used.

#### **2.10 VVVF AC MOTOR CONTROL**

- A. Variable Voltage Variable Frequency Motor Control:
  - 1. Dumbwaiter control shall be affected by means of a compact solid state motor control unit for each and every dumbwaiter with electrical characteristics to suit the power supply. The system

shall consist of the necessary three phase, full-wave bridge rectifiers.

2. Solid state motor control unit shall operate with high efficiency and low power consumption, have the capacity to handle peak currents typical of dumbwaiter service and contain a balanced, coordinated fault protection system which shall accomplish the following:
  - a. Protect the complete power circuit and specifically the power semi-conductors from failure under short circuit (bolted fault) conditions.
  - b. Protect against limited faults arising from partial grounds, partial shorts in the motor armature or in the power unit itself.
  - c. Protect the drive motor against sustained overloads. A solid state overload circuit shall be used.
  - d. Protect motor and power unit against instantaneous peak overload.
  - e. Provide semi-conductor transient protection.
  - f. Provide phase sequence protection to insure incoming line is phased properly.
  - g. Removable printed circuit boards shall be provided for the VVVF control. Design tabs so boards cannot be reversed.

#### **2.11 CALL-AND-SEND OPERATION FOR DUMBWAITERS**

- A. Car shall be dispatched from landing by manually closing car door and hoistway door and pressing call button for the landing corresponding to floor to be served, provided interlocked circuits have been established.
- B. Car shall be called to such landing by pressing button at floor to be served and shall proceed to destination.
- C. Car door shall be opened manually after car has stopped at landing.
- D. Landing push buttons shall be ineffective during travel of car through hoistway and for sufficient time after car has stopped to allow manual opening of car door and hoistway door.

#### **2.12 CORRIDOR OPERATING STATIONS AND CONTROL PANEL**

- A. Operating stations and control panel shall be stainless steel, flush mounted in or adjacent to the hoistway entrances.
  1. All faceplates shall have all edges beveled at 15 degrees.
  2. Fasten all faceplates with non-corrosive stainless steel tamperproof screws.

3. Operating push buttons in faceplates shall be designed so that pressure on contact shall be independent of pressure on operating push button.
  4. Each switch and operating device shall have indelible, 6 mm (1/4 in.) high legends to indicate its identity and position.
- B. Provide each floor served by dumbwaiter with a complete set of operating push buttons with 13 mm (1/2 in.) numbers in the face of the button corresponding to the floors served. Push buttons shall not protrude beyond the faceplate when in normal position. Call register lights shall be LED illuminated located within or behind the buttons. Illuminate the floor numeral corresponding to the call registered. Provide an "In Use" light in this panel to show when dumbwaiter is in operation or the door is open.
- C. Provide dumbwaiter with a control panel at the makeup area and as shown on drawings, containing the following:
1. Key operated "ON/OFF" service switch.
  2. Call and Send buttons to upper floors.
  3. A red LED illuminated indicator light to indicate a malfunction in the system.

#### **2.13 CORRIDOR LANTERN/POSITION INDICATOR**

- A. Provide each car with combination corridor lantern/position indicator digital display mounted over the hoistway entrances at each and every floor. Each lantern shall contain a single stroke chime so connected that when the dumbwaiter arrives at a landing, the chime shall sound momentarily. The lenses in each lantern shall be red LED illuminated. Lanterns shall signal in advance of dumbwaiter arrival at the landing. Audible signal shall not sound when a dumbwaiter passes the floor without stopping. Provide adjustable sound level on audible signal. Car riding lanterns are not acceptable.
- B. Provide alpha-numeric digital position indicators directly over hoistway landing entranceways between the arrival lanterns at each and every floor. Indicator faceplate shall be stainless steel. Numerals shall be not less than 25 mm (1 in.) high. Cover plates shall be readily removable for re-lamping.
- C. Provide LED illumination in each compartment to indicate the position and direction the dumbwaiter is traveling by illuminating the proper

alpha-numeric symbol. When the dumbwaiter is standing at a landing without direction established, arrows shall not be illuminated.

#### **2.14 MACHINE BEAMS**

- A. Provide structural steel beams required for direct support of an attachment to building structure of hoist machine, deflector sheaves, overhead sheaves, and rope dead-end hitch assemblies.
- B. Provide bearing plates, anchors, shelf angles, blocking, embedment, etc., for support and fastening of machine beams or equipment to the building structure.
- C. Provide hold-down bolts for offset hoist machines located beside or under hoistway where concrete hold-down pad is provided.

#### **2.15 GEARED WINDING DRUM MACHINE**

- A. The geared drum machine shall be of the single worm and gear type, with AC motor, spring applied and electrically released brake, sheave, pedestal mounted in proper alignment on a sound isolated steel plate. Mount machine in top or bottom of hoistway.
- B. Operate geared drum machine with alternating current control shall be the reversible direct current type, designed to meet the required high-starting torque with low-starting current. Rate the motor for 50 degrees C. rise, 60-minute rated motors and have sufficient capacity to operate dumbwaiter with rated load at rated speed without overheating.
- C. The hoisting machine brake shall be an electromagnetic drum or disc type, electrically released and spring applied.

#### **2.16 SHEAVES**

- A. Overhead sheaves shall be securely mounted on overhead beams in proper alignment with the traction sheave, two-to-one idler sheaves in counterweight head frame or car crosshead respectively.
- B. Deflector sheave bearings shall be the same as specified for hoisting machine, except that sheave bearings of the anti-friction bearing metal type with grease cup lubrication may be used for deflector sheaves and overhead sheaves used with machine mounted below, and two-to-one car and counterweight idler sheaves.
- C. Overhead deflector sheaves shall be provided with a substantial metal basket type guard mounted below the sheave. Guard shall be securely fastened to sheave beams.

- D. Provide two-to-one idler sheaves on car and counterweight with a metal guard which will effectively prevent foreign objects falling between ropes and sheave grooves, prevent ropes jumping off grooves in case of accident, and prevent accidental fouling by or injury to workmen on top of the car.

#### **2.17 HOIST ROPES**

- A. Provide dumbwaiter with hoisting ropes sufficient in size to provide at least the required factor of safety in accordance with ASME A17.1. Ropes shall be special traction steel conforming to Federal Specification RR-W-410 with minimum nominal diameter of one quarter inch.
  - 1. Ends of hoisting ropes shall be turned back and fastened with U-bolt clamps or shackled so rod assemblies will permit tension in ropes to be readily equalized.
  - 2. Where hoisting ropes pass around sheaves on car and counterweight, provide suitable guard on each sheave to prevent the ropes from jumping out of grooves in case of an accident, and to prevent injury to maintenance personnel working near sheaves.
  - 3. Hoisting Rope Data Tags: Attach metal data tag to one hoisting rope fastening to the dumbwaiter. Tag shall bear data as required by ASME A17.1.
- B. For dumbwaiters terminating above an occupied space, provide a broken rope safety device on car, and counterweight which will prevent the car and counterweight from falling if the ropes should break. Provide a switch on safety which will stop the machine when the safety is in operation.

#### **2.18 CAR AND COUNTERWEIGHT BUFFERS**

- A. Provide two spring buffers for each car and one for each counterweight. Buffers and supports shall be securely fastened to the pit channels, and in the alignment with striker plates on car. Every installed buffer shall have a permanently attached metal plate showing stroke and loading rating. Buffer anchorage shall not puncture pit waterproofing.
- B. Buffers shall be designed and installed to provide minimum car runby required by ASME A17.1 Rule 3.4.2.

- C. Pipe stanchions and struts shall be furnished, as required, to properly support the buffer.

#### **2.19 COUNTERWEIGHTS**

- A. Dumbwaiter shall be counterweighted to the extent of the weight of the car plus 40-50 percent of the rated capacity load, as required by controller manufacturer.
- B. Furnish two (2) tie rods with cotter pins and double nuts at top and bottom. Install set collars or other approved means on tie rods to prevent counterweight sub-weights from jumping and/or rattling. Both ends of tie-rods shall be visible and accessible.
- C. Provide counterweight guard in pit in accordance with ASME A17.1 Rule 2.3.2.

#### **2.20 CAR AND COUNTERWEIGHT GUIDES**

- A. Install on car and counterweight frame four flexible sliding swivel guide shoes each assembled on a substantial metal base, to permit individual self-alignment to the guide rails.
- B. Provide each shoe with renewable non-metallic gibs of durable plastic material having low coefficient of friction and long-wearing qualities when operated on guide rails receiving infrequent light applications of rail lubricant. Gibs containing graphite or other solid lubricants are not acceptable.
- C. Flexible guide shoes of approved design, other than swivel type, may be used provided they are self-aligning on all three faces of the guide rails.
- D. Provide spring take-up in car guide shoes for side play between rails.

#### **2.21 GUIDE RAILS, SUPPORTS, AND FASTENINGS**

- A. Guide rails shall conform to ASME A17.1 Section 2.23.
- B. Guide rails for car and counterweight shall be "Channel" type provided by the dumbwaiter manufacturer or planed steel "T-rails" and weigh 12 kg/m (8 lb/ft).
- C. Securely fasten guide rails to the brackets or other supports by heavy duty steel rail clips.
- D. Provide necessary rail brackets of sufficient size and design to secure substantial rigidity to prevent spreading or distortion of rails under any condition.

1. Slotted or oversized holes shall be fitted with flat washers and shall conform to ASME A17.1 Rule 2.23.10.3.
  2. Where fastenings are over 4.2 m (14 ft) apart, rails shall be reinforced with 228 mm (9 in.) channel or approved equal backing to secure the rigidity required.
- E. Rail joints and fishplates shall be in accordance with ASME A17.1 Rule 2.23.7. Rail joints shall not interfere with clamps and brackets. Design rail alignment shims to remain in place if fastenings become loose.
- F. Guide rails shall extend from channels on pit floor to within 76 mm (3 in.) of the underside of the concrete slab or grating at top of hoistway with a maximum deviation of 3.2 mm (1/8 in.) from plumb in all directions. Provide a minimum of 19 mm (3/4 in.) clearance between bottom of rails and top of pit channels.
- G. In the event inserts or bond blocks are required for the attachment of guide rails, the Contractor shall furnish such inserts or bond blocks and shall install them in the forms before the concrete is poured. Use inserts or bond blocks only in concrete or block work where steel framing is not available for support of guide rails. Expansion-type bolting for guide rail brackets will not be permitted.
- H. Guide rails shall be clean and free of any signs of rust, grease, or abrasion before final inspection. Paint the shank and base of the T-section with two field coats of manufacturer's standard enamel.

#### **2.22 NORMAL AND FINAL TERMINAL STOPPING DEVICES**

- A. Provide terminal stopping devices for dumbwaiter as follows:
1. Mount normal stopping switch on dumbwaiter or in hoistway to slow speed of car and bring it to automatic stop at terminal landings. Device shall permit operation of car in reverse direction.
- B. Mount final limit switches at top and bottom of hoistway which will be operated by car if it travels beyond terminal stops. Switches shall be independent of other stopping devices, positively operated, cut off power from hoisting motor and brake, and prevent operation of car in either direction. Pin all final limits and brackets to prevent movement.

### **2.23 CAR LEVELING**

- A. Car shall be equipped with a two-way leveling device to automatically bring the car to within 3 mm (1/8 in.) of exact level with the landing for which a stop is initiated regardless of load in car or direction.
- B. If the car stops short or travels beyond the floor, the leveling device, within its zone shall automatically correct this condition and maintain the car within 3 mm (1/8 in.) of level with the floor landing regardless of the load carried.
- C. Provide encoded steel tape, steel tape with magnets or steel vanes with magnetic switches. Submit design for approval.

### **2.24 EMERGENCY STOP SWITCHES**

- A. Provide in pit of dumbwaiter, an enclosed stop switch readily accessible from pit access door. Each switch shall be manually opened and closed with red operating handles or buttons conspicuously and permanently marked "STOP". Switches shall be positively opened mechanically and opening shall not be solely independent on springs.

### **2.25 HOISTWAY ACCESS SWITCHES**

- A. Provide hoistway access switches for dumbwaiter at top terminal landing to permit access to top of car, and at bottom terminal landing to permit access to pit. Mount the access key switch and the "On/Off" access activation switches in the top and bottom corridor hall stations next to the hoistway entrance jamb. Exposed portion of each access switch or its faceplate shall have legible, indelible legends to indicate "UP", "DOWN", and "OFF" positions. Submit design and location of access switches for approval. Each access switch shall be a constant pressure cylinder type lock having not less than five pins or five stainless steel disc combination with key removable only when switch is in the "OFF" position. Lock shall not be operable by any other key which will operate any other lock or device used for any other purpose at the VA Medical Center. Arrange the hoistway switch to initiate and maintain movement of the car. When the cartlift is operated in the down direction from the top terminal landing, limit the zone of travel to a distance not greater than the top of the car crosshead level with the top floor.

- B. Provide emergency access for all hoistway entrances, locked door release system (key access) for freight elevators, cartlifts, and dumbwaiters.

#### **2.26 HOISTWAY ENTRANCES**

- A. Entrances shall be the manufacturers' standard size with bi-parting or vertical sliding type.
- B. Frame shall be not less than No. 16-gauge stainless steel, coated inside, with 4.8 mm (3/16 in.) thick sound isolation mastic compound, assembled with smoothly dressed welded joints at the corners. Truckable sill shall be rigidly anchored and not less than No. 12-gauge stainless steel and shall be set true, straight and level, with hoistway edges plumb over each other. Reinforce sill with two steel angles full length. Sill shall be grouted full length after installation.
- C. Weight of the frames and method of fastening to hoistway wall shall conform to standard practice of dumbwaiter manufacturer. Provide gibs, struts from floor-to-floor, chains, and steel sheaves with sealed ball or roller bearings. Provide guides and stops for door travel.
- D. Door panels shall be flush hollow metal construction and bear a 1.5 hour Underwriters' "B" label, according to NFPA 252, 25 mm (1 in.) thick, of not less than No. 16-gauge stainless steel on both sides. Panels shall be reinforced. Interior of panels shall be filled with fireproof material. Upper door section shall be fitted with a neoprene non-movable minimum diameter one-inch door astragal. A hand pull shall be secured to the upper door section. Door guides shall be non-corrosive metal.
- E. The top section of the door panel shall be equipped with a glass vision panel of 6 mm (1/4 in.) thick wire glass not less than 76 mm (3 in.) or more than 100 mm (4 in.) in diameter.

#### **2.27 ELECTRIC INTERLOCKS**

- A. Equip each hoistway door with an interlock, functioning as hoistway unit system, to prevent operation of car until all hoistway doors are locked in closed position. Hoistway door interlock shall not be accepted unless it meets the requirements of ASME A17.1 Section 2.12.
- B. Equip car doors with electric contact that prevents operation of car until doors are closed unless car is operating in leveling zone or hoistway access switch is used. Locate door contact to prevent its

being tampered with from inside of car. Car door contact shall not be accepted unless it meets the requirements of ASME A17.1 Section 2.12.

- C. Wiring installed from the hoistway riser to each door interlock shall be NEC type SF-2 or equivalent.
  - 1. Type SF-2 cable terminations in the interlock housing shall be sleeved with glass braid fillers or equivalent.
- D. Provide devices, either mechanical or electrical, that shall prevent operation of the cartlift in event of damaged or defective door equipment that has permitted an independent car or hoistway door panel to remain in the "unclosed" and "unlocked" position.

#### **2.28 CAR SAFETY DEVICE**

- A. Provide "Type A Safeties" on the dumbwaiter that meet the requirements of ASME A17.1 Section 2.17.
- B. Field testing of car safety shall be as specified in Section 3.7 PRETEST and TEST of this specification.

#### **2.29 CAR FRAME**

- A. Construct car frames of structural shapes, ASTM A-36, rigidly bolted and welded together of adequate strength to support car with rated load and to conform to ASME A17.1 Rule 7.2.2.
- B. Provide a bonding wire between frame and platform.

#### **2.30 CAR ENCLOSURE**

- A. Car shall have width and depth required for contract load and is constructed of minimum 14-gauge stainless steel except car bottom shall be minimum 10-gauge stainless steel. Construction shall conform to ASME A17.1 Rule 7.2.1. Car bottom shall be arranged and reinforced to provide adequate support for loading and unloading unit and withstand impact of wheeled carts.
  - 1. Provide car entrance with vertical sliding, bi-parting door to each other by cables running over sheaves mounted at top of car. constructed of sheet panels of stainless steel, guided and connected Car door shall be opened and closed manually.
  - 2. Provide a flush car light fixture in car ceiling. Light shall be connected to illuminate automatically when car arrives at landing and hoistway door is opened, and shall be automatically extinguished when hoistway door is closed.

3. Provide metal nameplate in car showing name of manufacturer, and rated load in pounds, stamped, etched or raised letters.
- B. A service demand bell with a 76 mm (3 in.) diameter gong shall be provided on the dumbwaiter car. Bell shall be arranged to sound when a pushbutton is pressed while the car is standing at a floor with the door open. Bell shall be connected to a bell ringing transformer of proper capacity. Transformer shall be connected through fuses to the elevator power service in machine room.
- C. Surfaces of door frames, door panels, interior cab surfaces, etc., that become damaged or marred from any cause shall be restored to original condition in a satisfactory manner before final acceptance of work.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Examine work of other trades on which the work of this Section depends. Report defects to VA COR in writing that may affect the work of this trade or equipment operation dimensions from site for preparation of shop drawings.
- B. Ensure that shafts and openings for moving equipment are plumb, level and in line, and that pit is to proper depth, waterproofed and drained with necessary access doors and guard.
- C. Ensure that machine room is properly illuminated, heated and ventilated, and equipment, foundations, beams correctly located complete with floor and access stairs and door.
- D. Before fabrication, take necessary job site measurements, and verify where work is governed by other trades. Check measurement of space for equipment, and means of access for installation and operation. Obtain dimensions from site for preparation of shop drawings.
- E. Ensure the following preparatory work, provided under other sections of the specification has been provided. If the Elevator Contractor requires changes in size or location of hoist beam, or its support, trap doors, etc., to accomplish their work, he must make arrangements, subject to approval of the VA Contracting Officer and include additional cost, thereof, in their bid. Where applicable, locate controller near and visible to its respective hoisting machinery. Work required prior to the completion of the dumbwaiter installation:

1. Supply of electric feeder wires to the terminals of the dumbwaiter control panel, including circuit breaker.
  2. Provide light and GFCI outlets in the dumbwaiter pit and machine room.
  3. Furnish electric power for testing and adjusting dumbwaiter equipment.
  4. Furnish circuit breaker panel in machine room for car and hoistway lights and receptacles.
  5. Supply power for cab lighting and ventilation from an emergency power panel specified in Division 26, ELECTRICAL.
  6. Machine room enclosed and protected from moisture.
- F. Supply for installation, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.

### **3.2 SPACE CONDITIONS**

- A. Attention is called to overhead clearance, pit clearances, overall space in machine room, and construction conditions at building site in connection with dumbwaiter work. Addition or revision of space requirements, or construction changes that may be required for the complete installation of the dumbwaiters must be arranged for and obtained by the Contractor, subject to approval of the VA Contracting Officer. Include cost of such changes in bid, and form a part of the contract. Provide proper, code legal installation of equipment including all construction, accessories and devices in connecting with dumbwaiter, mechanical and electrical work specified herein.

### **3.3 INSTALLATION**

- A. Perform work with competent Certified Elevator Mechanics and Apprentices skilled in this work and under the direct supervision of the Elevator Contractor's experienced foreman.
- B. Set hoistway entrances in alignment with car openings, and true with plumb sill lines.
- C. Erect hoistway sills, headers and frames prior to erection of rough walls and doors. Erect fascias and toe guards after rough walls are finished.

- D. Install machinery, guides, controls, car and all equipment and accessories in accordance with manufacturer's instructions, applicable codes and standards.
- E. Isolate and dampen machine vibration with properly sized sound-reducing anti-vibration pads.
- F. Grout sills and hoistway entrance frames.

#### **3.4 ARRANGEMENT OF EQUIPMENT**

- A. Clearance around dumbwaiter, mechanical and electrical equipment shall comply with applicable provisions of NEC. Arrange equipment in machine room so that major equipment components can be removed for repair or replacement without dismantling or removing other equipment in the same machine room. Where applicable, locate controller near and visible to its respective hoisting machine.

#### **3.5 WORKMANSHIP AND PROTECTION**

- A. Installations shall be performed by Certified Elevator Mechanics and Apprentices to best possible industry standards. Details of the installation shall be mechanically and electrically correct. Materials and equipment shall be new and without imperfections.
- B. Recesses, cutouts, slots, holes, patching, grouting, refinishing to accommodate installation of equipment shall be included in the Contractor's work. All new holes in concrete shall be core drilled.
- C. Structural members shall not be cut or altered. Work in place that is damaged or defaced shall be restored equal to original condition.
- D. Finished work shall be straight, level and plumb, with true, smooth surfaces and lines. All machinery and equipment shall be protected against dirt, water, and mechanical injury. At final completion all work shall be thoroughly cleaned and delivered in perfect unblemished condition.
- E. Sleeves for conduit and other small holes shall project 50 mm (2 in.) above concrete slabs.
- F. Hoist cables which are exposed to accidental contact in the machine room and pit shall be completely enclosed with 16-gauge sheet metal or expanded metal or guards.
- G. Exposed gears, sprockets, sheaves, etc., shall be guarded from accidental contact in accordance with ASME A17.1 Section 2.10.

### **3.6 CLEANING**

- A. Clean machine room and equipment.
- B. Perform hoistway clean down.
- C. Prior to final acceptance remove protective covering from finished or ornamental surfaces. Clean and polish surfaces with regard to type of material.

### **3.7 PAINTING AND FINISHING**

- A. Hoist machine, motor, shall be factory painted with manufacturer's standard finish and color.
- B. Controller, sheave, car frame and platform, counterweight, beams, rails and buffers, except their machined surfaces, cams, brackets and all other uncoated ferrous metal items shall be painted one factory priming coat or approved equal.
- C. Upon completion of installation and prior to final inspection, all equipment shall be thoroughly cleaned of grease, oil, cement, plaster and other debris. All equipment, except that otherwise specified as to architectural finish, shall then be given two coats of paint of approved color, conforming to manufacturer's standard.
- D. Numbers 51 mm (2 in.) high designating dumbwaiter machine, controllers, and numbers on crossheads of dumbwaiter shall be painted or decaled as *required by ASME A17.1. Colors of numbers shall contrast with colors of surfaces to which they are applied.*
- E. Hoistway entrances of dumbwaiter:
  - 1. Door panels shall be stainless steel with a brushed finish.
  - 2. Fascia plates, toe guards, dust covers, hanger covers and other metal work, including built-in or hidden work and structural metal, (except stainless steel entrance frames and surfaces to receive baked enamel finish) shall be given an approved prime coat in the shop, and one field coat of paint of approved color.

### **3.8 PRE-TESTS AND TESTS**

- A. Pre-test the dumbwaiter and related equipment in the presence of the VA COR or his authorized representative for proper operation before requesting final inspection. Conduct final inspection at other than normal working hours, if required by VA COR.
  - 1. Procedure outlined in the Inspectors Manual for Electric Elevators, ASME A17.2 shall apply.

- a. Final test shall be conducted in the presence of and witnessed by an ASME QEI-1 Certified Elevator Inspector.
  - b. Government shall furnish electric power including necessary current for starting, testing, and operating machinery of each cartlift.
2. Contractor shall furnish the following test instruments and materials on-site and at the designated time of inspection: properly marked test weights, voltmeter, amp-meter and amp probe, thermometers, direct reading tachometer, and a means of two-way communication.
  3. If during the inspection process the Inspector determines the need, the following instruments shall be available within a four-hour period: Megohm meter, vibration meter, sound meter, and a light meter.
- B. Inspection of workmanship, equipment furnished, and installation for compliance with specifications.
- C. Balance Tests: The percent of counterbalance shall be checked by placing test weights in car until the car and counterweight are equal in weight when located at the mid-point of travel. If the actual percent of counter balance does not conform to the specification, the amount of counterweight shall be adjusted until conformance is reached.
- D. Full-Load Run Test: Dumbwaiter shall be tested for a period of one hour continuous run with full contract load in the car. The test run shall consist of the dumbwaiter stopping at all floors, in either direction of travel, for not less than five or more than ten seconds per floor.
- E. Speed Test: The actual speed of the dumbwaiter shall be determined in both directions of travel with full contract load, balanced load and no load in the dumbwaiter. Speed shall be determined by applying a certified tachometer to the car hoisting ropes or governor rope. The actual measured speed of the dumbwaiter with all loads in either direction shall be within three (3) percent of specified rated speed. Full speed runs shall be quiet and free from vibration and sway.
- F. Temperature Rise Test: The temperature rise of the hoisting motor shall be determined during the full load test run. Temperatures shall be measured by the use of thermometers. Under these conditions, the temperature rise of the equipment shall not exceed 50 degrees

Centigrade above ambient temperature. Test shall be started only when all parts of equipment are within five (5) degrees Centigrade of the ambient temperature at time of starting test. Other tests for heat runs on motors shall be performed as prescribed by the Institute of Electrical and Electronic Engineers.

- G. Car Leveling Test: Dumbwaiter leveling devices shall be tested for accuracy of leveling at all floors with no load in car, balanced load in car and with contract load in car, in both directions of travel. Accuracy of floor level shall be within plus or minus 3 mm (1/8 in.) of level with any landing floor for which the stop has been initiated regardless of load in car or direction of travel. The car leveling device shall automatically correct over travel as well as under travel and shall maintain the car floor within plus or minus 3 mm (1/8 in.) of level with the landing floor regardless of change in load.
- H. Brake Test: The action of the brake shall be prompt and a smooth stop shall result in the up and down directions of travel with no load and rated load in the elevator. Down stopping shall be tested with 125 percent of rated load in the dumbwaiter.
- I. Insulation Resistance Test: The dumbwaiter complete wiring system shall be free from short circuits and grounds and the insulation resistance of the system shall be determined by use of megohm meter, at the discretion of the Inspector conducting the test.
- J. Safety Devices: The safety devices shall be tested as required by ASME 17.1 Section 8.10.
- K. Overload Devices: Test all overload current protection devices in the system at final inspection.
- L. Limit Stops:
  - 1. The position of the car when stopped by each of the normal limit stops with no load and with contract load in the car shall be accurately measured.
  - 2. Final position of the dumbwaiter relative to the terminal landings shall be determined when the dumbwaiter has been stopped by the final limits. The lower limit stop shall be made with contract load in the dumbwaiter. Dumbwaiter shall be operated at inspection speed for both tests. Normal limit stopping devices shall be inoperative for the tests.

- M. Setting of Car Door Contacts: The position of the car door at which the dumbwaiter may be started shall be measured. The distance from full closure shall not exceed that required by ASME A17.1. The test shall be made with the hoistway doors closed or the hoistway door contact inoperative.
- N. Setting of Interlocks: The position of the hoistway door at which the dumbwaiter may be started shall be measured and shall not exceed ASME A17.1 requirements.
- O. Operating and Signal System: The dumbwaiter shall be operated by the operating devices provided and the operation signals and automatic floor leveling shall function in accordance with requirements specified. Starting, stopping and leveling shall be smooth and comfortable without appreciable steps of acceleration or deceleration.
- P. If equipment fails test requirements and a re-inspection is required, the Contractor shall be responsible for the cost of re-inspection; salaries, transportation expenses, and per-diem expenses incurred by the representative of the VA COR.

### **3.9 INSTRUCTION OF VA PERSONNEL**

- A. Provide competent instruction to VA personnel regarding the operation of equipment and accessories installed under this contract, for a period equal to one eight hour day. Instruction shall commence after completion of all work and at the time and place directed by the VA COR.
- B. In addition to oral instruction, written instructions in triplicate relative to care, adjustments and operation of all equipment and accessories shall be furnished and delivered to the VA COR in independently bound folders. DVD recordings will also be acceptable. Written instructions shall include correct and legible wiring diagrams, nomenclature sheet of all electrical apparatus including location of each device, complete and comprehensive sequence of operation, complete replacement parts list with descriptive literature, and identification and diagrammatic cuts of equipment and parts. Information shall also include electrical operation characteristics of all circuits, fields, relays, timers, regulators and electronic devices, as well as R.P.M. values and related characteristics for all rotating equipment.

- C. Provide supplementary instruction for any new equipment that may become necessary because of changes, modifications or replacement of equipment or operation under requirements of paragraph entitled "Warranty of Construction".

**3.10 INSPECTIONS AND SERVICE: GUARANTEE PERIOD OF SERVICE**

- A. Furnish complete inspection and maintenance service on entire dumbwaiter installation for a period of one (1) year after completion and acceptance of all the dumbwaiters in this specification by the VA COR. This maintenance service shall begin concurrently with the warranty. Maintenance work shall be performed by Certified Elevator Mechanics and Apprentices employed and supervised by the company that is providing guaranteed period of service on the dumbwaiter equipment specified herein.
- B. This contract will cover full maintenance including emergency call back service, inspections, and servicing the dumbwaiter listed in the schedule of elevators. The Elevator Contractor shall perform the following:
1. Monthly systematic examination of equipment.
  2. During each maintenance visit the Elevator Contractor shall clean, lubricate, adjust, repair and replace all parts as necessary to keep the equipment in first class condition and proper working order.
  3. Furnishing all lubricant, cleaning materials, parts and tools necessary to perform the work required. Lubricants shall be only those products recommended by the manufacturer of the equipment.
  4. Equalizing tension, shorten or renew hoisting ropes where necessary to maintain the safety factor.
  5. As required, motors, controllers, selectors, leveling devices, operating devices, switches on cars and in hoistways, hoistway doors and car doors or gate operating device, interlock contacts, guide shoes, guide rails, car door sills, hangers for doors, car doors or gates, signal system, car safety device, tension and sheaves in pit shall be cleaned, lubricated and adjusted.
  6. Guide rails, overhead sheaves and beams, counterweight frames, and bottom of platforms shall be cleaned every three months. Car tops and machine room floors shall be cleaned monthly. Accumulated rubbish shall be removed from the pits monthly. A general cleaning

- of the entire installation including all machine room equipment and hoistway equipment shall be accomplished quarterly. Cleaning supplies and vacuum cleaner shall be furnished by the Contractor.
7. Maintain the performance standards set forth in this specification.
  8. The operational system shall be maintained to the standards specified hereinafter including any changes or adjustments required to meet varying conditions of hospital occupancy.
  9. Maintain smooth starting and stopping and accurate leveling at all times.
- C. Maintenance service shall not include the performance of work required as a result of improper use, accidents, and negligence for which the Elevator Contractor is not directly responsible.
- D. Provide 24 hour emergency call-back service that shall consist of promptly responding to calls within one hour for emergency service should a shutdown or emergency develop between regular examinations. Overtime emergency call-back service shall be limited to minor adjustments and repairs required to protect the immediate safety of the equipment and persons using the dumbwaiter.
- E. Service and emergency personnel shall report to the VA COR or his authorized representative upon arrival at the hospital and again upon completion of the required work. A copy of the work ticket containing a complete description of the work performed shall be given to the VA COR.
- F. The Elevator Contractor shall maintain a log in the machine room. The log shall list the date and time of all monthly examinations and all trouble calls. Each trouble call shall be fully described including the nature of the call, necessary correction performed or parts replaced.
- G. Written "Maintenance Control Program" shall be in place to maintain the equipment in compliance with ASME A17.1 Section 8.6.

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