

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes all labor and materials necessary for the furnishing and installing of an electrically operated dumbwaiter as indicated on the drawing and/or specified herein.

1.2 DEFINITIONS

- A. Definitions in the latest version of ASME A17.1 apply to work of this Section.
- B. Defective Dumbwaiter Work: 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. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.

1.3 QUALITY ASSURANCE

- A. Regulatory agencies: dumbwaiter design, materials, construction clearances, workmanship, and tests shall conform to the requirements of the codes and regulations listed in Vertical Transportation, General.
- B. Welding: Welding shall be performed in accordance with the requirements of AWS or CWB. Welders shall produce evidence of current certification by AWS or CWB.
- C. Requirements of Regulatory Agencies
 - 1. Installer shall obtain and pay for all necessary permits and perform such tests as may be required for acceptance and approval of dumbwaiters by jurisdictional agencies.
 - 2. Installer shall notify the proper inspectors to witness required testing.

1.4 SUBMITTALS

- A. Refer to Section 14 20 00, Vertical Transportation, General.
- B. Product Data:
 - 1. Submit manufacturer's product data for each product and material.
 - 2. Indicate manufacturer, trade names, and model numbers, components, arrangement, optional and accessories being provided.
 - 3. Include applicable literature, catalog material or technical brochures.

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4. Include material and equipment specifications, sizes, types, dimensions, weights, rated capacities, and performance curves.
 5. Include utility requirements for wiring, piping, and service connection data, motor sizes complete with electrical characteristics.
- C. Shop Drawings:
1. Include plans, elevations, sections, and large-scale details indicating openings at each landing, machine room/equipment space layout, coordination with building structure, relationships with other construction, and locations of equipment.
 2. Include cab and entrance drawings, including dimensions, finishes and details.
 3. Include large-scale layout of car operating panels and hall fixtures.
 4. Indicate maximum dynamic and static loads imposed on building structure at points of support and maximum and average power demands.
 5. Power Confirmation Information: Include motor horsepower, code letter, starting current, full-load running current, and demand factor.
 6. All shop drawings submitted must be signed and sealed by an Engineer licensed in the state of Washington.
- D. Samples for Initial Selection: For finishes, including finished metals, materials with involving surface treatments, paint, and/or color selection.
- E. Maintenance Control Programs: within sixty (60) days after notice to proceed, and prior to installation, Installer shall submit detailed equipment specific interim and revenue service Maintenance Control Programs, showing functions to be performed and their scheduled frequency.
- F. Operating and Maintenance Manuals:
1. Description and sequence of operation of all equipment installed, including operating use for Building Personnel and tenants, as well as system troubleshooting manuals for technicians.
 2. Maintenance instructions and procedures of all vertical transportation equipment installed, including parts lists, for each dumbwaiter system.
 3. Lubrication charts indicating all lubricating points and type of lubricant recommended for all equipment.
 4. Complete parts catalogs for all replaceable parts.
- G. Tools:
1. The following equipment is furnished upon completion and before final payment:
 - a. The Dumbwaiter Contractor provides all the necessary tools, including laptop, hand-held devices, required software and manuals, required to troubleshoot, adjust, synchronize, calibrate, repair, and maintain the vertical transportation systems, as well as perform all necessary procedures to perform all safety tests as required by code and local governing authority.
 - b. Owner's equipment and software is updated regularly to properly troubleshoot, adjust, synchronize, calibrate, repair, maintain and test the vertical transportation systems. All equipment and/or software is of the same version as issued to technicians maintaining the vertical transportation systems.

- c. The Dumbwaiter Contractor provides a backup copy of any software that resides on the troubleshooting tool.
- d. Upon cancellation of service agreement, the Dumbwaiter Contractor provides all updates indicated above.

1.5 JOB CONDITIONS

- A. General: Refer to Section 14 20 00, Vertical Transportation, General.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. General:
 - 1. The protection of all equipment and exposed finishes is the responsibility of the Dumbwaiter Contractor during delivery, handling, and installation until final acceptance of dumbwaiter equipment.
 - 2. The Dumbwaiter Contractor replaces damaged materials with new, at no additional cost for material and labor.
- B. Delivery and Storage: It is the responsibility of the Dumbwaiter Contractor to properly store and protect all materials in space provided or designated by the Contractor against damage, stains, scratches, corrosion, weather, construction debris and environmental conditions.
- C. Hoisting: All required hoisting and movement of equipment is the responsibility of the Dumbwaiter Contractor.

1.7 COORDINATION

- A. General: Refer to Section 14 20 00, Vertical Transportation, General.
- B. Coordinate installation of VT equipment with integral anchors, and other items that are embedded in concrete or masonry for VT equipment. Furnish templates, sleeves, escalator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- C. Coordinate sequence of VT installation with other work to avoid delaying the Work.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair, restore, or replace dumbwaiter equipment that fails due to defective materials or poor workmanship within specified warranty period.
- B. Warranty Period: Twelve (12) months from date of Substantial Completion:
 - 1. The Dumbwaiter Contractor guarantees that the materials and workmanship of the apparatus installed by them and any subcontractor, under this contract, is first class in every

respect and that they will make good on any defects not due to ordinary wear and tear or improper use, which may develop within one year from the date of final acceptance of all equipment.

2. Manufacturer's warranty to repair or replace defective products or their components in the event of defects within a specified period.
3. Neither the final payment nor any provisions of the contract documents relieve the Dumbwaiter Contractor of any obligation provided by law. They shall remedy any defects and pay all expenses for any damage to other work.
4. The warranty as outlined above, for all devices, starts from the date of final acceptance of each device, by the Owner, of all work specified and intended under these contract documents.
5. All other services as required by Section 14 20 00, Vertical Transportation, General.

1.9 MAINTENANCE

A. General:

1. All maintenance is performed according to the guidelines stated in manufacturer's Maintenance and Operations manuals.
2. Maintenance records for each device, including lubrication logs, check charts, are provided in each control room.

B. Construction Maintenance:

1. Upon substantial completion of a device, after receiving sign-off from the governing authorities and acceptance from Consultant and/or Contractor, the device may be accepted for service before completion of the entire project.
2. During the Construction Maintenance period, the necessary preventive maintenance is performed on a scheduled basis.
3. Provide the necessary protection of the hoistway entrances and sills, hoistway fixtures, cab interiors and fixtures and car door sills.
4. Replacement or repair of components, due to misuse by others, is the responsibility of the Contractor/Owner.
5. Perform emergency callback service during normal working hours.
6. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of sixty minutes or less.

C. Warranty Maintenance:

1. Upon final acceptance of each device, subsequent to receiving acceptance and sign-off from the governing authorities and final acceptance, each device is accepted for full operation.
2. The warranty maintenance period begins for each device when all conditions in the above paragraph are met and will continue for a specified period.
 - a. Warranty Maintenance Period may begin at different times for each dumbwaiter.
3. The warranty maintenance program includes the following:
 - a. Monthly examinations, including adjustments, cleaning, and lubrication of equipment.
 - b. 24-hour Emergency Call back service is provided at no additional cost to Owner.

- c. Replacement of components as required, using only components produced by the original manufacturer.
- d. Each control room is equipped with a lockable storage cabinet to contain the necessary spare parts. See Specification 01 79 00 for spare parts list.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Installer Definitions: Terms used are defined in the latest edition of the Safety Code for Dumbwaiters and Escalators, ASME A17.1.
- B. American Society of Mechanical Engineers:
 - 1. ASME A17.1 - Safety Code for Dumbwaiters and Escalators.
 - 2. ASME A17.2 – Guide for Inspection of Dumbwaiters, Escalators, and Moving Walks.
 - 3. ASME A17.5 – Dumbwaiter and Escalator Electrical Equipment.
 - 4. ASME A17.6 – Standard for Dumbwaiter Suspension, Compensation, and Governor Systems.
- C. International Building Code (IBC)
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 – National Electric Code.
 - 2. NFPA 80 – Fire Doors and Windows.
 - 3. NFPA 101 – Life Safety Code.
- E. Washington Administrative Code, WAC.

2.2 MANUFACTURERS

- A. Subject to compliance with project requirements, provide products by one of the following:
 - 1. Dumbwaiter Systems **(DESIGN TEAM TO CONFIRM WITH PORT OF SEATTLE FOR SPECIFIC PROJECTS):**
 - a. Elevation Innovation Incorporated
 - b. MATOT Corporation
 - c. Powerlift Dumbwaiters Incorporated
 - d. Manufacturer's standard components, including machines, controllers, door equipment, fixtures, and cab enclosures, are approved.

2.3 FIELD CONDITIONS

- A. Seismic:

1. Dumbwaiter system withstands the effects of earthquake motions determined according to SEI/ASCE 7 and complies with dumbwaiter safety requirements for seismic risk Zone 2 or greater in ASME A17.1/CSA B44.
2. The term “withstand” means the system will remain in place without separation of any parts when subjected to the seismic forces specified.
3. Provide earthquake equipment required by ASME A17.1/CSA B44.
4. Provide Alpha-Numeric display if Earthquake Mode is needed.
5. Provide seismic switch required by SEI/ASCE 7.
6. Design earthquake spectral response acceleration short period (Sds): As Shown on Structural Drawings.
7. Occupancy Category: As Shown on Structural Drawings.
8. Project Seismic Design Category: As Shown on Structural Drawings.
9. Dumbwaiter Component Importance Factor (Ip): As Shown on Structural Drawings.

2.4 PERFORMANCE REQUIREMENTS

- A. Car Speed: $\pm 3\%$ of contract speed under any loading condition.
- B. Car Capacity: Safely lower, stop and hold 125% of rated load.
- C. Car Stopping Zone: $\pm 1/4$ " under any loading condition.
- D. Car Ride Quality:
 1. Acceleration and Deceleration: Smooth, constant, and not less than 2.5 feet/second².
 2. Sustained Jerk: Not more than twice the rate of acceleration.
- E. Noise and Vibration Control:
 1. Airborne Noise:
 - a. Measured noise level of dumbwaiter equipment and its operation does not exceed 55 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed.
 - b. Limit noise level in the control room relating to dumbwaiter equipment and its operation to no more than 80 dBA.
 2. Vibration Control: All dumbwaiter equipment is mechanically isolated from the building structure.

2.5 DUMBWAITERS

1. Capacity: TBD. **NOTE: Maximum capacity is 500 lbs. for a dumbwaiter unit.**
2. Contract Speed: 50 fpm
3. Roping: 1:1
4. Machine: Winding Drum
5. Machine Location: Top of Hoistway.
6. Operational Control: Call and Send microprocessor-based system
7. Motor Control: AC variable voltage variable frequency microprocessor-based with digital closed-loop feedback
8. Power Characteristics: 480 Volts, 3 Phase, 60 Hertz

9. Travel: As detailed on the Contract Drawings.
10. Platform Size: As detailed on the Contract Drawings.
11. Minimum Clear Inside Car: As detailed on the Contract Drawings.
12. Entrance Size: As detailed on the Contract Drawings.
13. Entrance Type: Power vertical bi-parting.
14. Safety: Instantaneous Type A, car
15. Guide Rails: Planed steel tees or “U” sections
16. Buffers: Spring
17. Car Enclosure: Stainless Steel shell as specified.

2.6 MATERIALS

- A. 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.
- B. 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. Burnished: Non-directional, random abrasion pattern.
- C. Aluminum: Extrusions per ASTM B221: sheet and plate per ASTM B209.
- D. Paint: 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. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.
- E. Prime Finish: Clean all metal surfaces receiving a baked enamel paint finish of oil, grease, and scale. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of primer.
- F. 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.

2.7 CAR PERFORMANCE

- A. Car Speed: $\pm 3\%$ of contract speed under any loading condition.
- B. Car Capacity: Safely lower, stop and hold 100% of rated load.

- C. Car Stopping Zone: $\pm 1/4$ " under any loading condition.
- D. Airborne Noise: Measured noise level of dumbwaiter equipment during operation shall not exceed 50 dBA in dumbwaiter lobbies under any condition including door operation.

2.8 OPERATION

- A. Call and Send Microprocessor-Based: Operate car from a hall button station located adjacent to the hoistway entrance at each floor. There shall be two buttons in each station: one button for calling the car to the floor, and one button representing the other floor served for sending the car. Momentary pressure on a button shall cause the car to start and automatically travel to the appropriate floor, provided the car is idle at a floor with car gate and hoistway door closed and not being held by a time-delay relay. After the car starts into motion, all buttons shall be ineffective until a predetermined time after the car has stopped at a floor and the doors have been opened and again closed, or the time has expired. An "in use" light in the hall button station shall be illuminated while the car is in transit. If a button is pressed after the "in use" light is extinguished and the hoistway doors are open, a bell on the car shall sound momentarily while the button is pressed. Arrival of the car at a floor shall be indicated by an arrival light and gong fixture.
- B. Automatic Car Stopping Zone: Stop car within $1/4$ " above or below the landing sill. Maintain stopping zone regardless of load in car, direction of travel, distance between landings, hoist rope slippage, or stretch.
- C. Remote Monitoring and Diagnostics: Equip each controller with standard ports, interface boards, and drivers to accept maintenance, data logging, fault finding diagnostic, and monitoring computers, keyboards, modems, and programming tools. The system shall be capable of driving remote color CRT monitors which continually scan and display the status of each car and call.
- D. 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 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.

2.9 MACHINE ROOM EQUIPMENT

- A. Arrange equipment in spaces shown on drawings.
- B. Winding Drum Machine: Single worm gear driven drum type machine with motor, brake, gear case, and drum mounted in proper alignment on a sound-isolated steel plate. Provide roller or ball bearings with means for lubrication. The brake shall be spring applied and electrically released.
- C. Geared Traction Hoist Machine:
 - 1. Single worm geared or helical geared traction type with AC induction or P.M.S.M. ACV³F motor, brake, gear, drive shaft, deflector sheave, and gear case mounted in proper alignment on an isolated bedplate.

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2. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.
 3. Provide hoist machine drip pans to collect lubricant seepage.
 4. Provide machine bedplate or supporting steel beams and fastenings to mount to building structure.
- D. Solid State Power Conversion and Regulation Unit:
1. Provide solid-state, alternating current, variable voltage, variable frequency (ACV³F), I.G.B.T converter/inverter drives.
 2. Design unit to limit current, suppress noise, and prevent transient voltage feedback into building power supply. Provide internal heat sink cooling fans for the power drive portion of the converter panels. Conform to IEEE standards 519-1992 for line harmonics and switching noise.
- E. Encoder: Direct drive, solid-state, digital type. Update car position at each floor and automatically restore after power loss.
- F. Controller: UL/CSA labeled.
1. Compartment: Wall-hung type with lockable door. Securely mount all assemblies, power supplies, chassis switches, relays, etc., on a substantial, self-supporting steel frame. Provide means to prevent overheating.
 2. Relay Design: Magnet operated with contacts of design and material to insure maximum conductivity, long life, and reliable operation without overheating or excessive wear. Provide wiping action and means to prevent sticking due to fusion. Contacts carrying high inductive currents shall be provided with arc deflectors or suppressors.
 3. Microprocessor-Related Hardware:
 - a. Provide built-in noise suppression devices which provide a high level of noise immunity on all solid-state hardware and devices.
 - b. Provide power supplies with noise suppression devices.
 - c. Isolate inputs from external devices (such as pushbuttons) with opto-isolation modules.
 - d. Design control circuits with one leg of power supply grounded.
 - e. Safety circuits shall not be affected by accidental grounding of any part of the system.
 - f. System shall automatically restart when power is restored.
 - g. System memory shall be retained in the event of power failure or disturbance.
 - h. Equipment shall be provided with Electro Magnetic Interference (EMI) shielding within FCC guidelines.
 4. Wiring: CSA labeled copper for factory wiring. Neatly route all wiring interconnections and securely attach wiring connections to studs or terminals.
 5. Permanently mark components (relays, fuses, PC boards, etc.) with symbols shown on wiring diagrams.
 6. Monitoring System Interface: Provide controller with serial data link through Ethernet connection and install all devices necessary to monitor items outlined in
 7. Provide controller mounted auxiliary, lockable "open," disconnecting means.
- G. Machine and Equipment Support Beams:
1. Provide structural steel beams required for direct support of and attachment to building structure of hoist machine, deflector sheaves, and hoist rope dead-end hitch assemblies.

2. Provide bearing plates, anchors, shelf angles, blocking, embedment, etc., for support and fastening of machine beams or equipment to the building structure.
3. Isolate machine and overhead sheave beams to prevent noise and vibration transmission to building structure.
4. Provide hold-down bolts for hoist machines located in pit where concrete hold-down pad is provided.

H. Noise and Vibration Control

1. Airborne Noise: Measured noise level of dumbwaiter equipment and its operation shall not exceed 60 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed. Limit noise level in the machine room relating to dumbwaiter equipment and its operation to no more than 80 dBA. All dBA readings to be taken 3'-0" off the floor and 3'-0" from the equipment using the "A" weighted scale.
2. Vibration Control: All dumbwaiter equipment provided under this contract, including power unit, controller, oil supply lines, and their support shall be mechanically isolated from the building structure and electrically isolated from the building power supply and to each other to minimize the possibility of objectionable noise and vibrations being transmitted to occupied areas of the building.

I. Sound Isolation:

1. Noise level relating to dumbwaiter equipment operation in machine room shall not exceed 80 dBA.
2. All dBA readings shall be taken 3'-0" off the floor and 3'-0" from equipment using the "A" weighted scale.

2.10 HOISTWAY EQUIPMENT

- A. Self-Supporting Tower: Structural steel tower with factory prime finish to support all dumbwaiter equipment and hoistway entrances.
- B. Guide Rails: Planed steel T-sections or U-sections for car of suitable size and weight for the application, including seismic reactions, including brackets for attachment to building structure.
- C. Buffers, Car: Spring type with blocking and support channels.
- D. Sheaves: Machined grooves and sealed bearings. Provide mounting means to machine beams, machine bedplate, car structural members, or building structure. Provide guards to prevent ropes from leaving their respective grooves.
- E. Terminal Stopping: Provide normal and final devices.
- F. 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 dumbwaiter controllers in the machinery space. Tag spares in controller.

2. Conduit:
 - a. Painted or galvanized steel conduit, EMT, or duct.
 - b. Minimum Conduit Size: 1/2".
 - c. Flexible heavy-duty service cord may be used between fixed car wiring and car door switches.
3. Traveling Cables: Flame and moisture-resistant outer cover. Prevent traveling cable from rubbing or chafing against hoistway or equipment within hoistway.

G. Entrance Equipment:

1. Door Guide Tracks: Continuous steel angles or formed steel tracks fastened to hoistway door jamb.
2. Door Interlocks: Operable without retiring cam.
3. Hoistway Door Unlocking Device: Provide unlocking device with pull chain under hinged, lockable cover with stainless steel No. 4 finish at all floors.

H. Floor Numbers: Stencil paint 4" high floor designations in contrasting color on inside face of hoistway doors in location visible from car top.

2.11 HOISTWAY ENTRANCES

- A. Complete entrances bearing fire labels from a nationally recognized testing laboratory approved within the governing jurisdiction.
- B. Frames: 14 gauge hollow metal at all floors. Bolted and lapped head to jamb assembly at all floors.
- C. Door Panels: Power vertical bi-parting.
- D. Sills: Extruded stainless steel, truckable channel sill with top surface set flush with finish floor.
- E. Finish of Frames and Doors: Satin finish stainless steel.

2.12 CAR EQUIPMENT

- A. Frame: Welded or bolted, rolled or formed steel channel construction.
- B. Safety Device: Type "A," instantaneous. Broken rope type.
- C. Platform: Construct entirely of steel.
- D. Guide Shoes: Swivel type with renewable oil-less inserts.
- E. Doors: Provide as specified for hoistway entrance doors.
- F. Door Tracks: Continuous steel angles or formed fastened to car enclosure.

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- G. Door Guide Shoes: Mechanical iron shoes. Four shoes per door panel with not less than 2½" lateral contact per shoe.
 - H. Door Electrical Contact: Prohibit car operation unless car doors are closed.

2.13 CAR ENCLOSURE

- A. Car Enclosure: Provide complete as specified herein. Provide the following features.
 - 1. Shell: Reinforced 16 gauge satin interior finish stainless steel.
 - 2. Canopy: Reinforced 16 gauge stainless steel formed panels with lockable, hinged emergency exit.
 - 3. Car Door Panels: Reinforced minimum 16 gauge satin finish stainless steel. Same construction as hoistway door panels.
- B. Lighting: Provide direct incandescent fixtures guarded with shatterproof glass flush mounted with inside of canopy with wiring and hookup.
- C. Removable Shelf: Provide a removable 14-gauge satin finish stainless steel shelf.

2.14 HALL CONTROL STATIONS

- A. Pushbuttons: Provide flush mounted riser adjacent to hoistway entrances. Include call and send buttons and "in use" light which illuminates when call is registered. Provide individual pushbuttons for each floor served. Provide vandal resistant pushbutton and light assemblies.

2.15 SIGNALS

- A. Arrival Lantern and Gong: Provide arrival light with single-stroke gong in or above the entrance head at each floor with a flush mounted faceplate.
- B. Door Open Bell: Mount 3" diameter bell on car top to be activated when a hall button is pressed while the dumbwaiter is at another floor with the door or gate open.
- C. Faceplate Material and Finish: Satin finish stainless steel, all fixtures.

2.16 SEISMIC OPERATIONS AND EQUIPMENT

- A. Provide design, components, and operation per governing code.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to beginning installation of equipment examine hoistway and control room areas.
- B. Verify no irregularities exist that affect execution of work specified.
- C. Verify electrical power location and characteristics in coordination with equipment requirements.
- D. Do not proceed with installation until work in place conforms to project requirements.

3.2 INSTALLATION

- A. Install all equipment in accordance with Contractor's instructions, referenced codes, specification, and approved submittals.
- B. Install control room 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.
- E. Install all equipment to afford maximum accessibility, safety, and continuity of operation.
- F. Clean all architectural finishes and replace or restore any surfaces damaged during construction to like new condition.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of dumbwaiter installation and before permitting dumbwaiter use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

3.4 CONSTRUCTION TOLERANCES

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

3.5 ADJUSTING

- A. Static balance car to equalize pressure of guide shoes on guide rails.

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

3.6 CLEANING

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

3.7 DEMONSTRATION:

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate all aspects of dumbwaiters while in normal operation.
- B. Determine that operation systems and devices are functioning properly.
- C. See Project Manual, Section 01 79 00 for additional training requirements.

END OF SECTION 14 10 00