

SECTION 14 92 00
PNEUMATIC TUBE SYSTEM

PART 1 GENERAL**1.1 DESCRIPTION**

- A. This section specifies the engineering, furnishing and installation of the complete Pneumatic Tube System as described herein and as indicated on the Contract drawings.
- B. Drawings and general provisions of contract, including General, Supplemental, Special conditions, and Division 01 Specification Sections, apply to this section.
- C. The Pneumatic Tubes size must be six (6) inches, (system size is the outside diameter of the tubing). Air Tubes must be four (4) inches. The system must include (add number) of stations. The system must include (add number) blowers. The system must include (add number) diverters and tubing to link all stations. The system must be expandable by adding stations, diverters, blowers, and tubing to accommodate future growth of the hospital.
- D. Provide (add number) carriers per station as required by the VA.

PNEUMATIC TUBE SCHEDULE	
Number of Stations	
Carrier Tube Size	6"
Air Tube Size	4"
Rated Load - kg (lb)	8 lbs
Contract Speed - m/s (fpm)	20 fps (average)
Total Travel - m (ft)	
Blower Assemblies	
Diverter Assemblies	

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 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirements for seismic restraint of non-structural components.
- E. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section.
- F. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.
- G. 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.
- H. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for cables and wiring.
- I. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Requirements for installing the over-current protective devices to ensure proper equipment and personnel protection.
- J. Section 26 22 00, LOW-VOLTAGE TRANSFORMERS: Low voltage transformers.
- K. Section 26 24 16, PANELBOARDS: Low voltage panelboards.
- L. Section 26 43 13, TRANSIENT-VOLTAGE SURGE SUPPRESSION: Surge suppressors installed in panelboards.
- M. Section 26 51 00, INTERIOR LIGHTING: Fixture and ballast type for interior lighting.

1.3 QUALIFICATIONS

- A. Approval by the Contracting Officer is required for products and services of proposed manufacturers, suppliers, installers, and must be contingent upon submission of certificates by the Contractor stating the following:
 - 1. Pneumatic Tube Contractor is currently and regularly engaged in the installation of Pneumatic Tube equipment as one of his principal products.
 - 2. Pneumatic Tube Contractor must have five (5) years of successful experience, trained supervisory personnel, and facilities to install Pneumatic Tube equipment specified herein.
 - 3. Mechanic (Installer) must have passed a Mechanic Examination approved by the U.S. Department of Labor and have technical qualifications of at least five years of experience in the pneumatic

- tube industry or 10,000 hours of field experience working in the pneumatic tube industry with technical update training. Apprentices must be actively pursuing Certified Mechanic status. Certification must be submitted for all workers employed in this capacity.
- B. Welding at the project site must be performed by certified welders who have previously qualified by test as prescribed in American Welding Society Publications AWS D1.1 to perform the type of work required. Certificates must be submitted for all workers employed in this capacity. A welding or hot work permit is required for each day and must be obtained from the VAMC safety department. Request permit one day in advance.
- C. Electrical work must be performed by a Licensed Master Electrician and Licensed Journeymen Electricians as requirements by NEC. Certificates must be submitted for all workers employed in this capacity.
- D. Approval will not be given to pneumatic tube contractors and manufacturers who have established on prior projects, either government, municipal, or commercial, a record for unsatisfactory pneumatic tube installations, have failed to complete awarded contracts within the contract period, and do not have the requisite record of satisfactory performing pneumatic tube installations of similar type and magnitude.
- E. Approval of Pneumatic Tube Contractor's equipment will be contingent upon their providing factory training, engineering and technical support, including all manuals, wiring diagrams, and tools necessary for adjusting, maintenance, repair, and testing of equipment to the VA for use by the VA's designated Pneumatic Tube System Maintenance Service Provider.
- Identifying a pneumatic tube maintenance service provider that must render services within (add number) hours of receipt of notification, together with certification that the quantity and quality of replacement parts in stock is sufficient to warranty continued operation of the pneumatic tube installation.
- F. Equipment within a pneumatic tube system must be the product of the same manufacturer.
- G. The Contractor must provide and install 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.

1.4 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification. Installation must 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:
- QQ-S-571E.....Solder, Electronic
- WW-T-799F.....Tube, Copper, Seamless, Water (For Use with
Solder-Flared or Compression-Type Fittings)
- C. National Fire Protection Association (NFPA):
- 80.....Fire Doors and Fire Windows
- 82.....Incinerators, Waste and Linen Handling Systems
and Equipment
- 90.....Installation of Air-Conditioning and
Ventilating Systems
- D. American Society for Testing and Materials (ASTM):
- A176-99.....Stainless and Heat-Resisting Chromium Steel
Plate, Sheet, and Strip
- A463-10.....Steel Sheet, Cold-Rolled, Aluminum-Coated, Type
1 and Type 2
- A653/A653M-11.....Steel Sheet, Zinc-Coated (Galvanized) by the
Hot-Dip process, Commercial Quality
- E. Underwriter's Laboratories (UL):
- 555.....Safety Fire Dampers

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 must 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 pneumatic tube system material must be forwarded to the Contracting Officer.
- B. Complete scaled and dimensioned layout in plan and section view showing the arrangement of equipment including details drawings of diverters, blowers, loading stations, riser anchoring, and each unit specified.

- C. Shop Drawings of Fabricated Equipment and Manufacturer's Literature.
 - 1. 6" Pneumatic Tubes
 - 2. 4" Air Tubes
 - 3. Loading Stations
 - 4. Discharge Openings with Automatic Fire Damper
 - 5. Door Locks
- D. Manufacturer's certificate stating that the loading and discharge doors and frames meet the requirements of Underwriter's Laboratory, Inc. for the fire rating specified.

1.6 WIRING DIAGRAMS

- A. Provide three complete sets of paper and one electronic set 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 elevator machine room as directed by the Resident Engineer.
- B. In the event field modifications are necessary during installation, diagrams must be revised to include all corrections made prior to and during the final inspection. Corrected diagrams must be delivered to the Resident Engineer within thirty (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 must 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 must 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 TOOL CABINET

- A. Provide a metal parts/tool cabinet, having two shelves and hinged doors. Cabinet size must be 1219 mm (48 in.) high, 762 mm (30 in.) wide, and 457 mm (18 in.) deep.

1.8 PERFORMANCE STANDARDS

- A. Contract speed is (add number) high speed in all direction of travel. Speed variation under all conditions, regardless of direction of travel, must not vary more than five (5) percent.
- B. All equipment including their supports and fastenings to the building, must be mechanically and electrically isolated from the building structure to minimize objectionable noise and vibration transmission to building structure, or adjacent occupied areas of building.
- C. The maximum noise limit emanating from the tubing during carrier transmission for all areas including corridors must be no greater than 55 dBA when measured from 167.6 cm (5'6") above the finished floor.

1.9 WARRANTY

- A. Submit all labor and materials furnished regarding elevator system and installation to terms of "Warranty of Construction" articles of FAR clause 52.246-21. The One-Year Warranty and Guarantee Period of Service must commence and run concurrent after final inspection, completion of performance test, and upon acceptance of the complete Pneumatic Tube System.
- B. During warranty period if a device is not functioning properly in accordance with specification requirements, more maintenance than the contract requires keeping device operational, device must be removed and a new device meeting all requirements must be installed as part of work until satisfactory operation of installation is obtained. Period of warranty must start anew for such parts from date of completion of each new installation performed, in accordance with foregoing requirements.

1.10 POWER SUPPLY

- A. For power supply in each machine room, see Specification 26 05 19, Electrical specifications, and Electrical drawings.
- B. Main Line Fused Disconnect Switch/Shunt Trip Circuit Breaker for each controller must be located inside the diverter/blower room at the strike jamb side of the entrance door and lockable in the "Off" position.
- C. Provide Surge Suppressors to protect the pneumatic tube system equipment.

1.11 EMERGENCY POWER SUPPLY

- A. Emergency power supply, its starting means, transfer switch for transfer of pneumatic tube system supply from normal to emergency

power, two pair of conductors in a conduit from an auxiliary contact on the transfer switch (open or close contacts as required by Controller Manufacturer) to terminals in the pneumatic tube system controller and other related work must be provided by the Electrical Contractor.

PART 2 PRODUCTS

2.1 MATERIAL - STAINLESS STEEL, COLD ROLLED STEEL, AND CARRIER/AIR TUBING

- A. Where stainless steel is specified, it must be corrosion resisting steel complying with Fed. Spec. QQ-S-766, Class 302 or 304, Condition A with Number 4 finish on exposed surfaces. Stainless steel must have the grain of belting in the direction of the longest dimension and surfaces must be smooth and without waves. During installation stainless-steel surfaces must be protected with suitable material.
- B. Where cold rolled steel is specified it must be low-carbon steel rolled to stretcher level standard flatness, complying with ASTM A109.
- C. Carrier and Air Tubing must be cold rolled, degreased, and electric welded steel.

2.2 MANUFACTURED PRODUCTS

- A. Materials, devices, and equipment furnished must be of current production by manufacturers regularly engaged in the manufacture of such items. The pneumatic tube equipment, including supervisory controllers, blowers, and diverters must be the product of manufacturers of established reputation, provided such items are capably engineered and produced under coordinated specifications to ensure compatibility with the total operating system.
- B. Manufacturers of equipment assemblies which include components made by others must assume complete responsibility for the final assembled unit. Components must be compatible with each other and with the total assembly for the intended service.
- C. When two (2) or more units of the same type or class of materials or equipment are required, these units must be products of the same manufacturer.
- D. Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
 - 1. All components of an assembled unit need not be products of the same manufacturer, but component parts which are alike are the products of a single manufacturer.
 - 2. Components are compatible with each other and with the total assembly for the intended service.

3. Nameplate bearing manufacturer's name or identifiable trademark securely affixed in a conspicuous place on equipment or name or trademark cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.
- E. The information shown on the contract drawings is intended to establish basic requirements of the system. Within these limitations, the Contractor is responsible for the final design of the Pneumatic Tube System and to make whatever modifications of, and additions to the drawings, as may be required to fulfill the performance requirements.
- F. Contractor is responsible for coordination of PTS drawings and installation with all other building systems.
- G. Contractor must pay special attention to existing structure provided in prior phases of construction.
- H. If key operated switches are furnished in conjunction with component of this elevator installation, furnish four (4) keys for each individual switch or lock. Provide different key tumblers for different switch and lock functions. Each key must have a tag bearing a stamped or etched legend identifying its purpose.

2.3 CONDUIT AND WIREWAY

- A. Install electrical conductors in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing, or metal wireways. Rigid conduit smaller than 18.75 mm (.75 in.) or electrical metallic tubing smaller than 12.5 mm (.50 in.) electrical trade size must not be used. All raceways completely embedded in concrete slabs, walls, or floor fill must be rigid steel conduit. Fully protect self-supporting connections, where approved, from abrasion or other mechanical injury. Flexible metal conduit not less than 9.375 mm (.375 in.) electrical trade size may be used, not exceeding 45 cm (18 in.) in length unsupported for applications permitted by NEC.
- B. All conduit terminating in steel cabinets, junction boxes, wireways, switch boxes, outlet boxes and similar locations must 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 using set screws or indentations as a means of attachment must not be used.

- D. Connect motor or other items subject to movement, vibration, or removal to the conduit or EMT systems with flexible, steel conduits.

2.4 CONDUCTORS

- A. Conductors must 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 must have color or number coding for each conductor. Conductors for control boards must 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 controllers, blowers, diverters, and fixtures.
- C. All wiring must test free from short circuits or ground faults. Insulation resistance between individual external conductors and between conductors and ground must be a minimum of one megohm.
- D. Where size of conductor is not given, voltage and amperes must not exceed limits set by NEC.
- E. Provide all equipment with earth ground. Ground the conduits, supports, controller enclosure, motor, and all other non-current conducting metal enclosures for electrical equipment in accordance with NEC. The ground wires must 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 elevator equipment must be solderless pressure wire connectors in accordance with Federal Specification W-S-610. The Pneumatic Tube System 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.

2.5 CONTROLLER AND SUPERVISORY PANEL

- A. UL/CSA Labeled Controller: Mount all assemblies, power supplies, chassis switches, and relays on a steel frame in a NEMA Type 1 General

Purpose Enclosure. Cabinet must be securely attached to the building structure.

- B. Properly identify each device on all panels by name, letter, or standard symbol which must be neatly stencil painted or decaled in an indelible and legible manner. Identification markings must be coordinated with identical markings used on wiring diagrams. The ampere rating must be marked adjacent to all fuse holders. All spare conductors to controller must be neatly formed, laced, and identified.
- C. Controller must be provided with wiring and components for additional future stations if required by the VA.

2.6 MICROPROCESSOR CONTROL SYSTEM

- A. Provide a microprocessor control system to control dispatching, diverter, blower, and signal functions. Complete details of the components and printed circuit boards, together with a complete operational description, must be submitted for approval.
- B. Controller manufacturer must provide factory training, engineering and technical support, including all manuals, wiring diagrams, and tools necessary for adjusting, maintenance, repair, and testing of equipment to the VA for use by the VA's designated Maintenance Service Provider.

2.7 LOADING STATION

- A. Set station flush with adjacent surface.
- B. Attach face plate to supports with stainless steel tamperproof screws.

2.8 SEISMIC REQUIREMENTS

- A. Meet the requirements of VA Seismic Design Manual H-18-8.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine work of other trades on which the work of this Specification depends. Report defects to the Resident Engineer in writing that may affect the work of pneumatic tube system contractor.
- B. Examine controller/diverter/blower room for proper illumination, heating, ventilation, electrical equipment, and beams are correctly located complete with access stairs and door.
- C. If the Pneumatic Tube System Contractor requires changes in size or location of trolley beams or their supports and trap doors, etc., to accomplish their work, he must justify the changes, subject to approval of the Contracting officer, and include additional cost in their bid.
- D. Work required prior to the completion of the pneumatic tube system installation:

1. Supply of electric feeder wires to the terminals of the pneumatic tube system control panel, including circuit breaker.
2. Provide light and GFCI outlets in the Controller/Diverter/Blower room.
3. Furnish electric power for testing and adjusting pneumatic tube system equipment.
5. Supply power for lighting and ventilation from an emergency power panel specified in Division 26, ELECTRICAL.
6. Controller/Diverter/Blower room enclosed and protected from moisture, with self-closing, self-locking door and access stairs.
7. Provide fire extinguisher in Controller/Diverter/Blower room.

3.2 ARRANGEMENT OF EQUIPMENT

- A. 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 room.

3.3 WORKMANSHIP, INSTALLATION, AND PROTECTION

- A. Installations must be performed by Certified Pneumatic Tube System Mechanics and Apprentices to best possible industry standards. Details of the installation must be mechanically and electrically correct. Materials and equipment must be new and without imperfections.
- B. Recesses, cutouts, slots, holes, patching, grouting, refinishing to accommodate installation of equipment must be included in the Contractor's work. All new holes in concrete must be core drilled.
- C. Structural members must not be cut or altered. Work in place that is damaged or defaced must be restored equal to original new condition.
- D. Finished work must be straight, plumb, level, and square with smooth surfaces and lines. All machinery and equipment must be protected against dirt, water, or mechanical injury. At completion, all work must be thoroughly cleaned and delivered in perfect unblemished condition.
- E. Sleeves for conduit and other small holes must project 50 mm (2 in.) above concrete slabs.

3.4 CLEANING

- A. Upon completion of installation and prior to final inspection, all equipment must be thoroughly cleaned of grease, oil, cement, plaster, dust, and other debris.
- B. Clean controller/diverter/blower room and equipment.

- C. Prior to final acceptance remove protective coverings from finished or ornamental surfaces. Clean and polish surfaces regarding type of material.

3.5 PAINTING AND FINISHING

- A. All equipment, except specified as architectural finish, must be painted one coat of approved color, conforming to manufacturer's standard.

3.6 PRETEST AND FINAL TEST

- A. Demonstrate entire system will with fully loaded linen bags and that it operates as specified. Demonstrate operation of fire damper at discharge opening.
- B. Resident Engineer or RE Representative must witness the system testing and final inspection.

3.7 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 must commence after completion of all work and at the time and place directed by the Resident Engineer.
- B. Written instructions in triplicate relative to care, adjustments and operation of all equipment and accessories must be furnished and delivered to the Resident Engineer in independently bound folders. DVD recordings will also be acceptable. Written instructions must 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 of with descriptive literature, and identification and diagrams of equipment and parts. Information must also include electrical operation characteristics of all circuits, relays, timers, electronic devices, 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".

3.8 MAINTENANCE SERVICE

Furnish inspection and maintenance service on all pneumatic tube system equipment for a period of one (1) year after notification by Department of Veterans Affairs that system is turned over for beneficial use. This

service must consist of examination by competent trained and qualified mechanic; cleaning, oiling, greasing, adjustments, and replacement of any parts required to place equipment in proper working order, (except for parts requiring replacement due to improper use, accidents, or operator negligence). Maintenance is to be performed monthly.

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