

SECTION 27 15 00
COMMUNICATIONS STRUCTURED CABLING

PART 1 - GENERAL**1.1 DESCRIPTION**

- A. This section specifies a complete and operating voice and digital structured cabling distribution system and associated equipment and hardware to be installed in VA Medical Center, here-in-after referred to as the "facility".

1.2 RELATED WORK

- A. Wiring devices: Section 26 27 26, WIRING DEVICES.
- B. General electrical requirements that are common to more than one section in Division 27: Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.
- C. Conduits for cables and wiring: Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS.

1.3 SUBMITTALS

- A. In addition to requirements of Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS provide:
1. List of test equipment as per 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.
- B. Certifications:
1. Submit written certification from OEM indicating that proposed supervisor of installation and proposed provider of contract maintenance are authorized representatives of OEM. Include individual's legal name and address and OEM warranty credentials in the certification.
 2. Pre-acceptance Certification: Submit in accordance with test procedures.
 3. Test system cables and certify to COR before proof of performance testing can be conducted. Identify each cable as labeled on as-installed drawings.
 4. Provide current and qualified test equipment OEM training certificates and product OEM installation certification for contractor installation, maintenance, and supervisory personnel.
- C. Closeout Submittal: Provide document from OEM certifying that each item of equipment installed conforms to OEM published specifications.

1.4 WARRANTY

- A. Work subject to terms of Article "Warranty of Construction," FAR clause 52.246-21.

PART 2 - PRODUCTS**2.1 SELECTION OF MATERIAL**

- A. All materials selected for use by installation contractor must be approved by VA Telecommunications personnel prior to installation.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Provide complete system including "punch down" blocks for voice, data patch panels, and associated hardware including telecommunications outlets (TCO); copper horizontal cables, connectors, faceplates, and outlets.
- B. Industry Standards:
1. Cable distribution systems provided under this section are connected to systems identified as critical care performing life support functions.
 2. Conform to National and Local Life Safety Codes (whichever are more stringent), NFPA, NEC, this section, Joint Commission Life Safety Accreditation requirements, and OEM recommendations, instructions, and guidelines.
 3. Provide supplies and materials listed by a nationally recognized testing laboratory where such standards are established for supplies, materials or equipment.
 4. Refer to industry standards and minimum requirements of Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and guidelines listed.
 5. Active and passive equipment required by system design and approved technical submittal; must conform to each UL standard in effect for equipment, when technical submittal was reviewed and approved by Government or date when COR accepted system equipment to be replaced. Where a UL standard is in existence for equipment to be used in completion of this contract, equipment must bear approved NRTL label.
- C. System Performance: Provide complete system to meet or exceed TIA Category 6 requirements.
- D. Coordinate size and type of conduit, pathways and firestopping for maximum 40 percent cable fill with subcontractors.

- E. Terminate all interconnecting twisted pair on patch panels or punch blocks. Terminate unused or spare conductors. Do not leave unused or spare twisted pair wire unterminated, unconnected, loose or unsecured.
- F. Color code distribution wiring to conform to ANSI/TIA 606-B and construction documents, whichever is more stringent. Label all equipment, conduit, enclosures, jacks, and cables on record drawings, to facilitate installation and maintenance.
- G. In addition to requirements in Section 27 05 11, REQUIREMENTS FOR COMMUNICATION INSTALLATIONS, provide stainless steel faceplates with plastic covers over labels.

2.3 EQUIPMENT AND MATERIALS

A. Cable Systems - Twisted Pair:

1. General:

- a. Provide cable (i.e. horizontal cabling) conforming to accepted industry standards with regards to size, color code, and insulation.
- b. All cabling shall be plenum rated.
- c. Provide proper test equipment to confirm that cable pairs meet each OEM's standard transmission requirements, and ensure cable carries data transmissions at required speeds, frequencies, and fully loaded bandwidth.
- d. Data cable UTP sheath/jacket shall be yellow.
- e. Phone/voice UTP sheath/jacket shall be white.
- f. RTLS UTP sheath/jacket shall be red.

2. Telecommunications Rooms (TR):

- a. Terminate data UTP cable on RJ-45, 8-pin connectors of 48-port modular patch panels.
- b. Terminate phone UTP cable on 110 punch down blocks.

3. Horizontal Cable: Installed from TCO jack to the TR patch panel.

- a. Tested to ANSI/TIA-568-C.2 Category 6 requirements including NEXT, ELFEXT (Pair-to-Pair and Power Sum), Insertion Loss (attenuation), Return Loss, and Delay Skew.
- b. Minimum Transmission Parameters: 250 MHZ.
- c. Provide four pair 23 AWG cable
- d. Terminate all four pairs on same port at patch panel in TR.
- e. Telecommunication Outlets (TCO):
 - 1) Jacks: Minimum three eight-pin RJ-45 ANSI/TIA-568-C.2 Category 6 Type jacks at TCO.

- a) Top Port: RJ-45 jack compatible with RJ-11 plug for voice. Jack shall be black.
- b) Bottom Two Ports: Unkeyed RJ-45 jacks for data. Left Jack shall be yellow and right jack shall be white.
- f. Real Time Locating System Outlets(RTLSO):
 - 1) Jacks: Minimum one eight-pin RJ-45 ANSI/TIA-568-C.2 Category 6 Type jacks at RTLISO.
 - a) Unkeyed RJ-45 jack for data, red in color.
- B. Telecommunication Room (TR):
 - 1. Terminate horizontal copper cables on appropriate cross-connection systems (CCS) containing patch panels, punch blocks, and breakout devices provided in enclosures and tested, regardless of installation method, mounting, termination, or cross-connecting used. Provide cable management system as a part of each CCS.
 - 2. Coordinate location in TR with FMS equipment (i.e. fire alarm, nurse call, code blue, video, public address, radio entertainment, intercom, and radio paging equipment).
- C. Horizontal Cabling (HC):
 - 1. Horizontal cable length to farthest system outlet to be maximum of 90 m (295 ft).
 - 2. Splitting of pairs within a cable between different jacks is not permitted.

2.4 DISTRIBUTION EQUIPMENT AND SYSTEMS

- A. Telecommunication Outlet:
 - 1. TCO consists of minimum one voice (telephone) RJ45 jack and two data RJ45 jacks mounted in a separate steel outlet box 100 mm (4 inches) x 100 mm (4 inches) x 63 mm (2-1/2 inches) minimum with a labeled stainless steel faceplate.
 - 2. Provide RJ-45/11 compatible female type voice (telephone) multi-pin connections. Provide RJ-45 female type data multi-pin connections.
 - 3. Provide wall outlet with a stainless steel face plate and sufficient ports to fit voice (telephone) multi-pin jack, data multi-pin jacks and plastic covers for labels when mounted on outlet box provided (minimum 100mm (4 inches) x 100mm (4 inches) for single outlet box applications.

PART 3 - EXECUTION

3.1 DEMOLISHING OLD CABLE

- A. All unused existing telecommunications data and voice cable is to be removed from the wall jack through the ceiling into the telecommunications closet and removed from patch panels and 110 blocks.

3.2 INSTALLATION

- A. Install for ease of operation, maintenance, and testing.
- B. Install system to comply with NFPA 70 National Electrical Code, NFPA 99 Health Care Facilities, NFPA 101 Life Safety Code, Joint Commission Manual for Health Care Facilities, and original equipment manufacturers' (OEM) installation instructions.
- C. Cable Systems Installation:
 - 1. Install system cables in conduit where concealed within walls, and free-air with J-hooks or similar means when concealed above ceilings.
- D. Labeling:
 - 1. Industry Standard: Provide labeling in accordance with ANSI/TIA-606-B.
 - 2. Print lettering of labels with laser printers; handwritten labels are not acceptable.
 - 3. Label both ends of all cables in accordance with industry standard. Provide permanent Labels in contrasting colors and identify according to system "Record Wiring Diagrams".
 - 4. Termination Hardware: Label workstation outlets connections using color coded labels with identifiers in accordance with industry standard and record on "Record Wiring Diagrams".
 - 5. If cable numbers already exists in communications rooms, number labeling sequence will be a continuation of existing cable numbers already in place on data patch panels and voice cables.

3.3 FIELD QUALITY CONTROL

- A. Interim Inspection:
 - 1. Verify that equipment provided adheres to installation requirements of this section. Interim inspection must be conducted by a factory-certified representative and witnessed by COR.
 - 2. Check each item of installed equipment to ensure appropriate NRTL label.
 - 3. Verify cabling terminations in telecommunications rooms and at workstations adhere to color code for T568B pin assignments and cabling connections comply with TIA standards.

4. Visually confirm marking of cables, faceplates, and patch panels
5. Notify COR of the estimated date the contractor expects to be ready for interim inspection, at least 20 working days before requested inspection date, so interim inspection does not affect systems' completion date.
6. Provide results of interim inspection to COR. If major or multiple deficiencies are discovered, COR can require a second interim inspection before permitting contractor to continue with system installation.
7. Do not proceed with installation until COR determines if an additional inspection is required. In either case, re-inspection of deficiencies noted during interim inspections must be part of the proof of performance test.

B. Pretesting:

1. Pretest entire system upon completion of system installation.
2. Verify during system pretest, utilizing the accepted equipment, that system is fully operational and meets system performance requirements of this section.
3. Provide COR four copies of recorded system pretest measurements and the written certification that system is ready for formal acceptance test.

C. Acceptance Test:

1. After system has been pretested and the contractor has submitted pretest results and certification to COR, then schedule an acceptance test date and give COR 30 days' written notice prior to date acceptance test is expected to begin.
2. Test only in presence of a COR.
3. Test utilizing approved test equipment to certify proof of performance.
4. Verify that total system meets the requirements of this section.
5. Include expected duration of test time, with notification of the acceptance test.

D. Verification Tests:

1. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has an overall shield. Test cables after termination and prior to cross-connection.

E. Performance Testing:

1. Perform Category 6 tests in accordance with TIA-568-B.1 and TIA-568-B.2. Include the following tests - wire map, length, insertion loss, return loss, NEXT, PSNEXT, ELFEXT, PSELFEXT, propagation delay and delay skew.

F. Total System Acceptance Test: Perform verification tests for UTP after complete telecommunication distribution system and workstation outlet are installed.

3.4 MAINTENANCE

A. Accomplish the following minimum requirements during one year warranty period:

1. Respond and correct on-site trouble calls, during standard work week:
 - a. A routine trouble call within one working day of its report. A routine trouble is considered a trouble which causes a system outlet to be inoperable.
 - b. Standard work week is considered 8:00 A.M. to 5:00 P.M., Monday through Friday exclusive of Federal holidays.
2. Respond to an emergency trouble call within six hours of its report. An emergency trouble is considered a trouble which causes a subsystem or distribution point to be inoperable at any time.
3. Respond on-site to a catastrophic trouble call within four hours of its report. A catastrophic trouble call is considered total system failure.
 - a. If a system failure cannot be corrected within four hours (exclusive of standard work time limits), provide alternate equipment, or cables within four hours after four hour trouble shooting time.
 - b. Routine or emergency trouble calls in critical emergency health care facilities (i.e., cardiac arrest, intensive care units, etc.) are also be deemed as a catastrophic trouble.
4. Provide COR written report itemizing each deficiency found and the corrective action performed during each official reported trouble call. Provide COR with sample copies of reports for review and approval at beginning of total system acceptance test.

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