

**SECTION 27 10 00**  
**STRUCTURED CABLING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, and connection of the structured cabling system to provide a comprehensive telecommunications infrastructure.

**1.2 RELATED WORK**

- A. Excavation and backfill for cables that are installed in conduit: Section 31 20 11, EARTH MOVING.
- B. Sealing around penetrations to maintain the integrity of time rated construction: Section 07 84 00, FIRESTOPPING.
- C. General electrical requirements that are common to more than one section in Division 27: Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.
- D. Conduits for cables and wiring: Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS.
- E. Requirements for personnel safety and to provide a low impedance path for possible ground fault currents: Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS.

**1.3 SUBMITTALS**

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
1. Manufacturer's Literature and Data: Showing each cable type and rating.
  2. Certificates: Two weeks prior to final inspection, deliver to the COTR four copies of the certification that the material is in accordance with the drawings and specifications and has been properly installed.

**1.4 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by the basic designation only.
- B. American Society of Testing Material (ASTM):  
D2301-04.....Standard Specification for Vinyl Chloride  
Plastic Pressure Sensitive Electrical Insulating  
Tape
- C. Federal Specifications (Fed. Spec.):

A-A-59544-00.....Cable and Wire, Electrical (Power, Fixed  
Installation)

D. National Fire Protection Association (NFPA):

70-05.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):

44-02.....Thermoset-Insulated Wires and Cables

83-03.....Thermoplastic-Insulated Wires and Cables

467-01.....Electrical Grounding and Bonding Equipment

486A-01.....Wire Connectors and Soldering Lugs for Use with  
Copper Conductors

486C-02.....Splicing Wire Connectors

486D-02.....Insulated Wire Connector Systems for Underground  
Use or in Damp or Wet Locations

486E-00.....Equipment Wiring Terminals for Use with Aluminum  
and/or Copper Conductors

493-01.....Thermoplastic-Insulated Underground Feeder and  
Branch Circuit Cable

514B-02.....Fittings for Cable and Conduit

1479-03.....Fire Tests of Through-Penetration Fire Stops

**PART 2 - PRODUCTS**

**2.1 CONTROL WIRING**

- A. Unless otherwise specified in other sections of these specifications, control wiring shall be as specified for power and lighting wiring, except the minimum size shall be not less than No. 14 AWG.
- B. Control wiring shall be large enough so that the voltage drop under inrush conditions does not adversely affect operation of the controls.

**2.2 COMMUNICATION AND SIGNAL WIRING**

- A. Shall conform to the recommendations of the manufacturers of the communication and signal systems; however, not less than what is shown.
- B. Wiring shown is for typical systems. Provide wiring as required for the systems being furnished.
- C. Multi-conductor cables shall have the conductors color coded.

**2.3 WIRE LUBRICATING COMPOUND**

- A. Suitable for the wire insulation and conduit it is used with, and shall not harden or become adhesive.
- B. Shall not be used on wire for isolated type electrical power systems.

**2.4 FIREPROOFING TAPE**

- A. The tape shall consist of a flexible, conformable fabric of organic composition coated one side with flame-retardant elastomer.

- B. The tape shall be self-extinguishing and shall not support combustion. It shall be arc-proof and fireproof.
- C. The tape shall not deteriorate when subjected to water, gases, salt water, sewage, or fungus and be resistant to sunlight and ultraviolet light.
- D. The finished application shall withstand a 200-ampere arc for not less than 30 seconds.
- E. Securing tape: Glass cloth electrical tape not less than 0.18 mm (7 mils) thick, and 19 mm (3/4 inch) wide.

#### **2.4 STATION CABLES**

- A. All cables will be Unshielded Twisted 4-Pair, rated Cat 6 or higher.
- B. Data cable sheath shall be "Dark Blue" in color.
- C. Voice cable sheath shall be "Gray" in color.
- D. All cables must be one continuous run between work station and communications closet - NO SPLICES.
- E. All cables will be installed in conduit from wall jack to ceiling and stubbed out above false ceiling and run in cable trays or other designated cable support to telecom closets.

#### **2.5 SELECTION OF MATERIAL(S)**

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

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION, GENERAL**

- A. Install all wiring in raceway systems.
- B. Seal cable and wire entering a building from underground, between the wire and conduit where the cable exits the conduit, with a non-hardening approved compound.
- C. Wire Pulling:
  - 1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables.
  - 2. Use ropes made of nonmetallic material for pulling feeders.
  - 3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the COTR.
  - 4. Pull in multiple cables together in a single conduit.

#### **3.2 INSTALLATION IN MANHOLES**

- A. Install and support cables in manholes on the steel racks with porcelain or equal insulators. Train the cables around the manhole walls, but do not bend to a radius less than six times the overall cable diameter.
- B. Fireproofing:

1. Install fireproofing where low voltage cables are installed in the same manholes with high voltage cables; also cover the low voltage cables with arc proof and fireproof tape.
2. Use tape of the same type as used for the high voltage cables, and apply the tape in a single layer, one-half lapped or as recommended by the manufacturer. Install the tape with the coated side towards the cable and extend it not less than 25 mm (one inch) into each duct.
3. Secure the tape in place by a random wrap of glass cloth tape.

### **3.3 CONTROL, COMMUNICATION AND SIGNAL WIRING INSTALLATION**

- A. Unless otherwise specified in other sections, install wiring and connect to equipment/devices to perform the required functions as shown and specified.
- B. Except where otherwise required, install a separate power supply circuit for each system so that malfunctions in any system will not affect other systems.
- C. Where separate power supply circuits are not shown, connect the systems to the nearest panelboards of suitable voltages, which are intended to supply such systems and have suitable spare circuit breakers or space for installation.
- D. Install a red warning indicator on the handle of the branch circuit breaker for the power supply circuit for each system to prevent accidental de-energizing of the systems.
- E. System voltages shall be 120 volts or lower where shown on the drawings or as required by the NEC.

### **3.4 CONTROL, COMMUNICATION AND SIGNAL SYSTEM IDENTIFICATION**

- A. Install a permanent wire marker on each wire at each termination.
- B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
- C. Wire markers shall retain their markings after cleaning.
- D. In each manhole and handhole, install embossed brass tags to identify the system served and function.

### **3.5 TERMINATING COPPER CABLES - IN COMMUNICATION ROOMS**

- A. All data cables shall be terminated on CAT-6 rated RJ-45 Jack Inserts, using EIA/TIA-568A wiring configuration. Data cables will be terminated into patch panels mounted on a standard 19" data rack(s).
- B. All voice cables will be terminated into CAT-6 rated patch panels and terminated into standard 19" data rack(s).
- C. All cables will be numerically labeled at both ends of terminations.

### **3.6 TERMINATING COPPER CABLES - AT WORKSTATIONS**

- A. All data cables shall be terminated on CAT-6 rated RJ-45 Jack Inserts, using EIA/TIA-568A wiring configuration.
- B. All data jack inserts will be Black in color.
- C. All voice cables will be terminated onto RJ-11 Jack inserts using standard USOC wiring configuration.
- D. All voice jack inserts will be Office White in color.
- E. All jack inserts will be installed unto flush wall mounted face plates. Face plates shall be Office White in color. Each face plate will be a 4-port configuration.
- F. Each work station will be wired with 2-data cables and 1-voice cable.
- G. A communications outlet will installed every walls designated as administrative floor space.

### **3.7 TERMINATING FIBER OPTIC CABLES**

- A. All fiber optic terminations must be in compliance with BICSI standards of installation. Must be installed in bright colored orange inner-duct appropriate for size of fiber being pulled.
- B. All fiber optic must be terminated in an enclosed fiber box with service loop mounted into a 19" data rack that for service to network switch equipment (switch provided by government). **Terminations must be ST type connections in fiber termination box.**
- C. Unless otherwise designated, fiber cable will be multi-mode 62.5 micron. Testing of each fiber must be conducted with no failures -100 Pass for all fibers. Test results must be furnished to government in either paper or electronic format.

### **3.8 CABLE LABELING (NUMBERS ONLY)**

- A. All cables shall be numbered sequentially and mechanically stenciled with black ink - NOT HAND WRITTEN. Cable number labels will be placed at both ends of each cable, on patch panels, and wall mounted face plates.
- B. 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.

### **3.7 CABLE MANAGEMENT**

- A. All cables will be home run from each work-station area to the designated communications room.
- B. All cables will be suspended in ceiling using J-type hooks or placed in cable trays.

- C. In office areas all cables will be installed inside conduit. Conduit will be run from wall jack to extend above false ceiling where conduit maybe stubbed out. (Unless security specifications require enclosed conduit for entire cable run).
- D. All wall penetrations made above ceilings through fire rated walls must be sealed with fire rated materials. If existing conduits are used and fire stopper material is removed from conduits, conduits will be resealed with rated materials once cables are installed.
- E. Cables in communication rooms will be neatly run into rack compatible cable management systems raceways.

### **3.7 TESTING CABLE**

- A. All cables installed must be tested and verified for full 100Mb transmission speed and continuity to verify that all pairs are functional to support voice and data systems. Test results must be printed and provided to VA Telecommunications personnel prior to acceptance of the work that was performed.

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