SECTION 27 13 13
COMMUNICATIONS BACKBONE ISP TWISTED PAIR CABLING
Construction Specification

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Backbone ISP (inside plant/indoor) twisted pair cabling.

B. Related Sections

1. Comply with the Related Sections requirements of Section 270000.

2. Section 270811, “Communications Twisted Pair Testing”

1.2 REFERENCES

A. Comply with References requirements of Section 270000.

B. In addition to the codes and standards listed in Section 270000, comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. National Fire Protection Agency (NFPA)

a. NFPA 262, “Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces”, 2007

2. Underwriters Laboratories (UL): Applicable listing and ratings, including but not limited to the following standards:

a. UL 444, “Communications Cables”

b. UL 497, “Protectors for Paired-Conductor Communication Circuits”

c. UL 497A, “Secondary Protectors for Communications Circuits”

d. UL 497B, “Protectors for Data Communications and Fire-Alarm Circuits”

e. UL 497C, “Protectors for Coaxial Communications Circuits”

f. UL 1581, “Reference Standard for Electrical Wires, Cables, and Flexible Cords”

g. UL 1666, “Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts”

h. UL 1863, “Communications-Circuit Accessories”

3. Insulated Cable Engineers Association (ICEA)

a. ANSI/ICEA S-90-661-2008, “Category 3, 5, and 5e Individually Unshielded Twisted Pair Indoor Cable for Use In General Purpose and LAN Communication Wiring Systems”

b. ICEA S-102-700-2004, “ICEA Standard For Category 6 Individually Unshielded Twisted Pair Indoor Cables (With Or Without An Overall

Shield) For Use In Communications Wiring Systems Technical Requirements”

4. Telcordia

a. GR-111, “Generic Requirements for Thermoplastic Insulated Riser Cable”

1.3 DEFINITIONS

A. Refer to Section 270000 for Definitions.

B. In addition to those Definitions of Section 270000, the following list of terms as used in this specification defined as follows:

1. “CMP”: Communications Media Plenum [NEC plenum rating]

2. “CMR”: Communications Media Riser [NEC riser/non-plenum rating]

3. “ISP”: Inside Plant [cabling]

4. “PE”: Polyethylene

5. “PIC”: Plastic Insulated Conductor

6. “PVC”: Polyvinyl Chloride

7. “PVDF”: Polyvinylidene fluoride

1.4 SYSTEM DESCRIPTION

A. Work Covered Under Other Sections

1. Pathways: The communications pathways (backbone conduits, riser sleeves, basketway, cable tray, etc.) work will be covered under another Section. Refer to the Drawings for size/capacity and route information.

2. Rooms: Build out (e.g., backboards, overhead and vertical cable runway, etc.) of the rooms (MDF, BDFs, IDFs) will be covered under another Section. Refer to the Drawings for build out information.

B. Base Bid Work

1. Provide engineering, labor, materials, apparatus, tools, equipment, and transportation required to make a complete working telecommunications backbone twisted pair cabling system installation described in these specifications and shown on related Drawings.

2. The Drawings are diagrammatic in nature, and require shop drawings to complete the detailed design of the telecommunications infrastructure.

3. Consider backbone cabling shown on the Drawings as base bid work, unless otherwise noted. This includes terminations at both ends.

4. In general, the base bid work includes:

a. Submittals

b. Backbone inside plant (riser) twisted pair (copper) cables and termination apparatus

c. Bonding (termination apparatus)

d. Cable management

e. Crossconnects

f. Cable identification tags and system labeling

g. Record Documents

h. Warranty

1.5 SUBMITTALS

A. Comply with Submittal procedural, quantity, and format requirements of Section 270000.

B. Submittal Requirements Prior To Start Of Construction:

1. Product Data Submittal, indicating conformance with NEC, UL, TIA/EIA listings, certifications and specifications.

2. Schedule Submittal, consisting of proposed schedule of work. This schedule may be combined with the schedule developed for Division 27.

3. Shop Drawings Submittal, consisting of proposed changes to cable routing, or termination locations/configurations.

C. Submittal Requirements at Closeout:

1. As-Built Drawings

2. Crossconnection records/cut sheets

3. O & M Manuals

D. Substitutions

1. Requests for substitutions shall conform to the general requirements and procedure outlined in Section 270000.

1.6 QUALITY ASSURANCE

A. Comply with Quality Assurance requirements of Section 270000.

B. Contractor Qualifications

1. In addition to the Contractor Qualifications requirements of Section 270000, the Contractor shall be manufacturer certified to install the proposed and submitted cabling system and to provide an extended warranty. Provide satisfactory evidence of certification in the form of a current letter or certificate from the manufacturer as part of the bid submission.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with Delivery, Storage and Handling requirements of Section 270000.

1.8 WARRANTY

A. The telecommunications cabling system, as specified in this section, shall carry a 15-year (minimum) extended system warranty. This extended warranty shall cover parts and labor for the duration of the extended warranty. This extended warranty shall also cover electrical performance of cabling system to the specific category per ANSI/TIA/EIA-568-B performance criteria for backbone cabling.

PART 2 PRODUCTS

2.1 UNSHIELDED TWISTED PAIR CABLES – PLENUM

A. Application:

1. Suitable for indoor installation, between floors in vertical riser system and through overhead ceiling space (in cable tray, conduit, & hangers).

2. Each and every cable run shall be a continuous single cable, homogenous in nature. Splices are not permitted anywhere.

3. Twisted pair PIC type, air core cable.

B. Conductors and Insulation:

1. Annealed solid copper, 24 AWG

2. Fully insulated, consisting of a flame-retardant PVC or other thermoplastic.

3. Conductors shall be twisted into pairs. Twisted pairs shall be stranded into 25-pair bundles.

4. Color Coding: Twisted pairs and units individually color-coded to industry standards (ANSI/ICEA Publication S-80-576, and EIA-230).

C. Core and Sheath:

1. Cable sheath consisting of an overall flame-retardant PVDF, or equivalent, jacket.

D. Cable shall be NEC rated as CMP, and UL listed as such.

E. Electrical performance of the twisted pairs and overall cable shall comply with TIA/EIA-568-A requirements for Category 3 UTP cabling.

F. Manufacturers:

1. CommScope SYSTIMAX

2. General Cable

3. Superior Essex

2.2 UNSHIELDED TWISTED PAIR CABLES – NON-PLENUM

A. Application:

1. Cable suitable for indoor installation, between floors in vertical riser system and through overhead ceiling space (in cable tray, conduit, & hangers).

2. Each and every cable run shall be a continuous single cable, homogenous in nature. Splices are not permitted anywhere.

3. Twisted pair PIC type, air core cable.

B. Conductors:

1. Annealed solid copper, 24 AWG

2. Fully insulated, consisting of a flame-retardant PVC or other thermoplastic.

3. Conductors twisted into pairs are stranded into 25-pair bundles and into units.

4. Color Coding: Twisted pairs and units individually color-coded to industry standards (ANSI/ICEA Publication S-80-576, and EIA-230).

C. Core & Sheath:

1. Cable sheath shall consist of an overall flame-retardant PVC, or equivalent, jacket.

2. NEC rated as CMR and UL listed as such.

D. Performance:

1. Electrical performance of the twisted pairs and overall cable that complies with TIA/EIA-568-A requirements for Category 3 UTP cabling.

E. Manufacturers:

1. CommScope SYSTIMAX

2. General Cable

3. Superior Essex

2.3 TERMINATION APPARATUS – “66 BLOCK” TYPE (MPOE)

A. Application:

1. MPOE Termination apparatus shall be “66 block” type.

2. Termination apparatus shall be suitable for installation within the MPOE for the termination of the backbone twisted pair cables specified within this Section.

3. Termination apparatus shall be vertically oriented and suitable for hamaco frame installations.

4. Termination apparatus, accompanied by the quantity of management panels, shall provide for both horizontal and vertical routing of cords and crossconnect wires, as shown on the drawings.

B. Manufacturer:

1. Siemon Company

a. S66M1-50; 66 Block, 50 pair

2. Hubble Premise Wiring

a. #HPW66M150; 66 Block, 50 pair

b. Or Equal

C. MDF Termination

1. Note that MDF/IDF twisted pair cables will terminate in the network rack

2.4 CROSSCONNECT WIRE

A. Crossconnect wire shall be suitable for installation within a telecommunication facility and fully compatible with the termination apparatus specified within this Section.

B. Crossconnect wire shall be manufactured from a single, continuous length of insulated wire, homogenous in nature. Splices are not permitted anywhere. Factory splices of insulated conductors are expressly prohibited.

C. Conductors:

1. Conductors: 24 AWG solid copper

2. Insulation: fully insulated conductors with a flame-retardant thermoplastic (such as PVC, or equivalent)

3. Twisted Pairs: Two insulated conductors “twisted” into a “pair” (twisted pair), individually color-coded.

D. Manufacturer:

1. Belden B-Plus Crossconnect Wire

2. CommScope SYSTIMAX

3. General

4. Or equal

2.5 LABELS

A. Labels shall be machine printable with a laser printer, ink jet printer, thermal transfer printer, or hand-held printer.

B. Labels for Cables

1. Labels shall be adhesive-backed and have a self-laminating feature

2. Labels shall fit the backbone cables listed above (i.e., shall fully wrap around the cable’s jacket).

3. Printable area should be 1 inch wide x 0.5 inch high, or larger

4. Printable area color shall be white

5. Manufacturer:

a. Panduit

1. #S200X400YAJ; labels for 25 to 100 pair cables [0.32” (8.09mm) - 0.95” (24.26mm) dia.]

b. Or equal

C. Termination Apparatus Labels

1. Labels shall be adhesive backed

2. Printable area color shall be white for backbone termination field and gray for ‘2nd level’ backbone termination field

PART 3 EXECUTION

3.1 GENERAL

A. Comply with the Execution requirements of Section 270000.

3.2 EXAMINATION AND PREPARATION

A. Rooms: Prior to installation, verify equipment rooms are suitable to accept the backbone twisted pair cables and terminations.

B. Pathways: Prior to installation verify that pathways and supporting devices, provided under other sections, are properly installed, and that temporary supports, devices, etc., have been removed. Verify dimensions of pathways, including length (for example, “True Tape” the conduits).

C. Cable Integrity: Prior to installation, verify the twisted pair cable is fully operational – both cable sheath and twisted pair conductors. Documentation of pre-installation testing is not a close out requirement, and is the responsibility of the Contractor.

3.3 INSTALLATION

A. Backbone Cable Installation and Routing

1. Cable runs shall have continuous sheath continuity, homogenous in nature. Splices are not permitted anywhere.

2. Maximum cable length of 500 meters from the termination within the Entrance Facility to the termination in Telecommunications Room.

3. Placement

a. Place cables within designated pathways.

b. Maintain a minimum bend radius of 6 times the cable diameter during and after installation.

c. Maintain pulling tension within manufacturer's limits.

d. Place and suspend cables in a manner to protect them from physical interference or damage. Place cables with no kinks, twists, or impact damage to the sheath. Replace cables if damaged during installation

e. Place a pull rope along with cables where run in conduit and spare capacity still exists in the conduit. Tie off ends of the pull rope.

4. Routing

   a. When routing horizontally within telecommunications rooms, utilize the overhead cable support. When routing vertically within telecommunications rooms, utilize the vertical cable support and provide cable ties every 24 inches on center using.

   b. Route cables a minimum of 6" away from power sources to reduce interference from EMI.

5. Termination

   a. Provide 15 feet cable slack loop at each end of the run. Store slack in overhead cable support or as noted on Drawings.

   b. Properly relieve strain from cables at termination points per manufacturer's instructions.

   c. Terminate twisted pairs onto the termination apparatus in accordance with manufacturer's latest instructions and TIA/EIA-568-B standard installation practices.

   d. Perform post-installation testing as described in section 270811.

B. Termination Apparatus

1. Provide accessories required for a complete installation.

2. Install the termination apparatus to the dimensions shown on the Drawings. If the dimensions are not shown, install the termination apparatus such that the bottom row of terminations is no lower than 24 inches (+/- 3") AFF and the top row of terminations is no higher than 60 inches (+/- 3") AFF.

3. Mount termination apparatus plumb and square.

4. Bond termination apparatus to grounding point (busbar) – refer to section 270526 for additional information.

C. Crossconnects

1. In the MDF, provide one 1-pair crossconnect to length from the equipment field to the backbone field based on the records from the IDF crossconnections.

2. Utilize the horizontal and vertical management components to properly route the crossconnect wire.

3. Splices in crossconnect wire are prohibited.

3.4 LABELING

A. General Requirements

1. Labeling and identifier assignment and the label colors shall conform to the TIA/EIA-606-A Administration Standard and as approved by Owner or Owner's Representative before installation.

2. Provide permanent and machine-generated labels; hand written labels will not be accepted.

B. Cable Labels

1. Label Format:

a. Label type shall be wrap-around self-laminating.

b. Label color shall be white background with clear laminating window.

c. Text color shall be black; text height shall be 1/8” high, minimum, or #12 font size.

2. Provide labels on both ends of cables. Fully wrap label around the cable jacket. Install labels no more than 4 inches from the edge of the cable jacket. Install labels such that they are visible by a technician from a normal stance.

C. Termination Apparatus Labels

1. Use labels included in the product packaging. For substitutions, request approval by the Engineer.

2. Label color shall be white for respective field type, per TIA/EIA-606-A.

3. Text color shall be black, 3/32” high, minimum, or #10 font size.

D. Identifier Assignment

1. General: Separate label fields of the identifier with a hyphen.

2. Backbone ISP Twisted Pair Cables

a. First field shall identify the originating termination room identifier as shown on the plans; for example, “B01-TDA”.

b. Second field shall identify the ending termination room identifier as shown on the plans; for example, “B01-TDB”.

c. Third field of the identifier shall be the campus pair count range; for example, “0401-0600”

d. Example: “B01-TDA–B01-TDB–0401-0600”

3. Termination Positions at Patch Panels

a. Each port shall be labeled with the pair count of the campus infrastructure.

3.5 FINAL INSPECTION AND CERTIFICATION

A. Punch the Work of this Section compliant to the requirements of Section 270000.

B. Remove and replace with new, at no cost to the Owner, cables or conductors failing to meet the indicated standards and not passing the testing requirements of Section 270811. The Owner, or Owner’s Representative, will not accept the installation until testing has indicated a 100% availability of all cables and conductors or the Owner or Owner’s Representative has approved any deviation from this requirement.

C. Comply with system acceptance and certification requirements of Section 270000.

END OF SECTION