

**SECTION 27 15 13**  
**COMMUNICATIONS COPPER HORIZONTAL CABLING**

**PART 1 - GENERAL**

**1.1 STIPULATIONS**

- A. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and "Division 01 – General Requirements" form a part of the Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

**1.2 SUMMARY**

- A. This section provides the minimal requirements for the installation of multi-pair unshielded twisted pair (UTP) cables and associated hardware system horizontal cabling. Included in this section are the product requirements for cable, termination hardware and other required hardware. Installation practices and test requirements are also indicated in this section. Contractor shall provide a complete tested and warranted structured cabling system.
- B. Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
1. 4-pair Unshielded Twisted Pair (UTP) Cable
  2. Coaxial Cable

**1.3 REFERENCES**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. Related Documents and Sections:
1. Division 01 – General Requirements
  2. Section 27 00 00 – Communications General
  3. Section 27 05 26 – Grounding and Bonding for Communications Systems
  4. Section 27 05 28 – Pathways for Communications Systems
  5. Section 27 11 16 – Communications Cabinets, Racks, Frames and Enclosures
  6. Section 27 11 23 – Communications Cable Management and Ladder Rack
  7. Section 27 13 13 – Communications Copper Backbone Cabling
- C. The following codes, associations, acts and agencies, as required by law.
1. NFPA-70, 2011 (National Electric Code)
  2. National Electrical Safety Code (NESC)
  3. Occupational Safety and Health Administration (OSHA)
- D. The current edition of the following standards:
1. Refer to Section 27 00 00 – Communications General

E. The current edition of the following guidelines:

1. Refer to Section 27 00 00 – Communications General

F. When a discrepancy arises between the above-mentioned codes, standards or guidelines and the standards contained in this document, it shall be brought to the attention of the Owner immediately for resolution. The more stringent of the two guidelines shall be implemented.

#### **1.4 SYSTEM DESCRIPTION**

A. Horizontal cabling system shall provide interconnections between Telecommunications Rooms (TR) to all Work Area Outlets (WAO), Telecommunications Outlets (TO) and Equipment Outlets (EO).

B. Horizontal cabling system shall provide connection of file servers, personal computer stations, telephones, wireless access points, printers, and all other equipment.

C. Contractor shall furnish, install, test and place into satisfactory and successful operation all equipment, materials, devices, and necessary appurtenances to provide a complete ANSI/TIA compliant communications horizontal cabling system.

#### **1.5 SUBMITTALS**

A. Refer to Section 27 00 00 – Communications General

B. Shop drawings showing construction details and locations of components, and description and routing of cable tray.

C. Provide table of contents with all product names, manufacturer, and specific product number identified to accompany manufacturer's product information cut sheets or specifications sheet.

#### **1.6 QUALITY ASSURANCE**

A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed.

B. Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing data cabling.

C. Contractor must have personnel certified by BICSI on staff.

1. Preparation of Shop Drawings and Cabling Administration Drawings by an RCDD.

2. Installation shall be under the direct supervision of Registered Technician, who shall always be present when Work of this Section is performed at Project site.

3. Currently certified by BICSI as an RCDD to supervise on-site testing.

### **PART 2 - PRODUCTS**

## **2.1 MATERIALS**

### **A. Approved Manufacturers:**

1. CommScope Category 6 U/UTP CS44P Series Cable (BOD)
2. General
3. Superior Essex
4. Approved Equal

## **2.2 4-PAIR UNSHIELDED TWISTED PAIR (UTP) CABLE**

- A. Horizontal cabling shall be ANSI/TIA-568.2-D Class EA performance rated Category 6. All cables shall be imprinted by the manufacturer as Category 6, at minimum.
- B. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or 16 feet in the horizontal cross-connect.
- C. All cabling shall consist of four (4) unshielded twisted pairs; non-bonded solid bare copper conductors, color-coded per the band strip color coding conventional standard as follows:
  - A. Pair #1 - White/Blue-Blue
  - B. Pair #2 - White/Orange-Orange
  - C. Pair #3 - White/Green-Green
  - D. Pair #4 - White/Brown-Brown
- D. All Horizontal system cables shall be CMP.
- E. Horizontal system cabling color shall be:
  - A. Primary data connection in set: Blue
  - B. Secondary data connection in set: Green
  - C. Voice connection in set: White
  - D. Computer lab connections: Blue
  - E. Wireless Access Point connections: Violet (alternatively, Blue may be used, but the jacks must be Violet)
  - F. Security Camera connections: Orange (alternatively, Blue may be used, but the jacks must be Orange)
  - G. Emergency Phone connections: Red
- F. Performance Requirements
  - A. Comply with ASTM E 84, testing by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    1. Flame-Spread Index: 25 or less.
    2. Smoke-Developed Index: 50 or less.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with ANSI/TIA-607-C.

## **2.3 PATHWAYS**

- A. Comply with ANSI/TIA-569-D.
- B. Comply with Section 27 05 28 – Pathways for Communications Systems of this standard.
- C. NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
- D. Support brackets with Velcro tie slots for fastening Velcro ties to brackets.
- E. Lacing bars, spools, J-hooks, and D-rings.
- F. Straps and other devices.

## **2.4 COAXIAL CABLE**

- A. General Coaxial Cable Requirements
  - 1. Broadband type recommended by cable manufacturer specifically for broadband data transmission applications.
  - 2. Coaxial cable and accessories shall have 75-ohm nominal impedance with return loss of 20dB maximum from 7 to 806 MHz.
- B. RG-6/U
  - 1. No. 16 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation.
  - 2. Quad-shielded with 100 percent aluminum polyester tape and 95 percent aluminum braid.
  - 3. Copolymer Jacket.
- C. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70, "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:
  - 1. CATV Cable: Type CATV.
  - 2. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
- D. RG-6/U Connector
  - 1. Type F, 75 ohms
  - 2. Compression connector

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Specified pulling tensions and bend radius shall be used in the installation of cables.

- B. All horizontal cabling shall be run with no splices.
- C. Contractor shall adhere to ANSI/TIA 568/569 specifications regarding bend radius, maximum tensile strength, and maximum vertical rise.

### **3.2 INSTALLATION**

- A. Where cables are supported from building structure, they shall be adequately supported such that the cable will not be damaged by normal building use.
- B. Cables shall not be installed or routed in any manner that violates the manufacturer's specifications. Manufacturer's minimum bend radius for static (post installation) cables is 10 times the cable diameter. Manufacturer's minimum bend radius for cables under strain (pulling tension) is 20 times the cable diameter.
- C. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
- D. Install 110-style IDC termination hardware unless otherwise indicated.
- E. No service loop required on end of each cable.
- F. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.
- G. Do not exceed a pulling tension of 25 lb/f. during the installation of 4 pair balanced twisted-pair cables. Refer to manufacturer's pulling tension guidelines for multi-pair cables.
- H. Unless otherwise specified, terminate cables in accordance with ANSI/TIA-568.1-D, Commercial Building Telecommunications Cabling Standard, observing the industry standards for terminating color-coded cables for premises and campus environments.
- I. Do not install damaged or defective cable. Installation of damaged cable will not be accepted. Unless otherwise allowed by the Owner, damaged cable shall be removed, and new cable installed at the expense of the Contractor. Damage includes physical damage to the cable and damage that may affect performance. THE OWNER WILL NOT ACCEPT CABLE OF ANY TYPE UNTIL AFTER IT IS INSTALLED AND PASSES A PHYSICAL INSPECTION AND ALL PERFORMANCE TESTS.
- J. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
- K. Suspend UTP cable not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports ideally 48 inches but not more than 60 inches apart.
- L. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- M. Cables shall not be tied or supported by pipes, ducts, ceiling support wires or other building components which are not part of the communications pathway system.
- N. Separation guidelines for routing pathways from power lines and equipment:

Separation of Telecommunications Pathways from Power Lines			
Minimum Separation Distance			
Condition	<2KV	2-5KV	>5KV
Unshielded power lines or electrical equipment in proximity to open or non-metal raceways.	5 inches	12 inches	24 inches
Unshielded power lines in proximity to a grounded metal raceways.	2.5 inches	6 inches	12 inches
Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to a grounded metal raceways.	N/A	3 inches	6 inches

### 3.3 FIRE-STOPPING

- A. Comply with ANSI/TIA-569-D, Annex A, "Fire-stopping."
- B. Comply with BICSI TDMM, Chapter 8 "Fire-stopping."

### 3.4 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with ANSI/TIA-607-C.
- C. Comply with Section 27 05 26 – Grounding and Bonding for Communications Systems.

### 3.5 TESTING

- A. New cable pairs shall be end-to-end tested as follows.
  - 1. DC loop resistance
  - 2. Wire map
  - 3. Continuity to remote end
  - 4. Shorts between two or more conductors
  - 5. Crossed pairs
  - 6. Reversed pairs
  - 7. Split pairs
- B. All balanced twisted-pair field testers shall be factory calibrated each calendar year by the field test equipment manufacturer as stipulated in the manuals provided with the field test unit. The calibration certificate shall be provided for review prior to the start of testing. Autotest settings, provided in the field tester for testing the installed cabling, shall be set to the manufacturer default parameters for the type and characteristics of the cable to be tested.

- C. Tests shall be performed with connectors and termination completed and in-place.
- D. Any cable or component not satisfactorily passing the tests as described or failing to meet quality installation standards as described in this specification, shall be repaired and/or replaced at the Contractor's expense.
- E. The Contractor shall prepare complete cable test reports for all installed cables for review and approval of Owners IT Group prior to acceptance of the cabling system.

**END OF SECTION**