

SECTION 27 15 13

COMMS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Category 6A unshielded twisted pair cable.
 2. Twisted pair cable termination hardware, including plugs and jacks.

1.2 COPPER HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cabling system must provide interconnections between the IDF and the equipment outlet, otherwise known as horizontal permanent link in the telecommunications cabling system structure. Cabling system consists of horizontal cables, mechanical terminations, and patch cords.
1. TIA-568-C.1 requires that a minimum of two equipment outlets be installed for each work area.
 2. Horizontal cabling must contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
 3. All horizontal copper cabling must be CMP Plenum rated unless noted otherwise.
- B. A work area is comprised of the components that extend from the data outlets to the station equipment.
- C. The maximum allowable horizontal cable length is 260 feet (80 m). This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.3 CODES, STANDARDS, AND GUIDELINES

- A. In addition to all applicable codes, standards, and guidelines listed in Division 27 Sections "General Communications Requirements" and "Structured Cabling System", follow the most recent editions of the following:
1. NFPA 70 (NEC) – "National Electrical Code" (NEC)
 2. IEEE NESC - "National Electrical Safety Code"
 3. ANSI/BICSI 005 – "Electronic Safety and Security System Design and Implementation Best Practices"
 4. ANSI/NECA/BICSI-607 – "Standard for Telecommunications Bonding and Grounding Planning and Installation methods for Commercial Buildings"
 5. ANSI/TIA-568 – "Commercial Building Telecommunications Cabling Standard Set"
 6. ANSI/TIA-569 – "Commercial Building Standard for Telecommunications Pathways and Spaces"

7. ANSI/TIA-607 – “Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises”
8. ANSI/TIA-606 – “Administration Standard for Commercial Telecommunications Infrastructure”
9. BICSI – “Telecommunications Distribution Methods Manual”
10. BICSI – “Information Technology Systems Installation Methods Manual”
11. IEEE 142 – “Recommended Practice for Grounding of Industrial and Commercial Power Systems” (Green Book)
12. IEEE 1100 – “Recommended Practice for Powering and Grounding Electronic Equipment” (Emerald Book)

1.4 ACTION SUBMITTALS

- A. Product Data:
- B. Each of the cables specified. Cut sheets shall include the following information at a minimum:
 1. Manufacturers name and logo
 2. Cable outside diameter
 3. Number of conductors/strands in each cable and binder group
 4. Gauge or strand thickness
 5. Minimum transmission performance rating
 6. Cable jacket material and rating
 7. Maximum pulling tension
 8. Jacket/Sheath color
 9. Individual conductor or strand insulation colors
 10. Minimum bend radius
 - a. During installation and post installation.
 11. As well as any additional information required by individual sections of this Division.
- C. Faceplates and modules. Cut sheets shall include the following information at a minimum:
 1. Manufacturers name and logo
 2. Material type
 3. Performance rating
 4. Physical Dimensions
 5. Color
- D. Product information of test equipment to be used for the testing of cabling.
- E. Provide documentation indicating manufacturer required and recommended maintenance and calibration services and intervals at which these services shall be performed.
- F. Shop Drawings:
 1. Submit for review scaled layout drawings showing the routing of all cabling, and the locations where terminal blocks, patch panels, Telecommunications outlets, cable types, cable jacket listing information, firestop locations (with quantity and

- NRTL system number identified), furniture feed points, and fiber optic termination panels are to be installed.
2. Shall show the number of horizontal cables served by each room and the number of patch panels and termination blocks to be installed (including those to accommodate 10% growth).
3. Each individual outlet on the drawings shall have proposed outlet identification indicated.
4. Unless otherwise required by these specifications, it is permissible to show different cabling systems (voice, data, CATV, A/V) on the same shop drawing.
5. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.

G. Testing

1. Qualifications: Identity and qualifications of the personnel who will perform the testing as required above in the Quality Assurance paragraph.
2. Submit all physical characteristics needed for appropriate testing setup and verification. I.e. Nominal velocity of propagation (NVP) for each and every cable type. This parameter shall be identified and submitted for review. Such submittals for all parameters shall be from printed manufacturers' cut-sheets or other manufacturers' printed material.
3. Submit the proposed schedule for performing testing at least 2 weeks prior to the start of testing.

H. Sample warranty information as indicated herein and elsewhere in this Division.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Device address list.
3. Printout of software application and graphic screens.

C. As-Built Drawings

1. Submit scaled layout drawings showing the routing of all cabling, and the locations where terminal blocks, patch panels, Telecommunications outlets, cable types, cable jacket listing information, firestop locations (with quantity and NRTL system number identified), furniture feed points, and fiber optic termination panels have been installed.
2. Shall show the number of horizontal cables served by each room and the number of patch panels and termination blocks installed (including those to accommodate 10% growth).
3. Unless otherwise required by these specifications, it is permissible to show different cabling systems (voice, data, CATV, A/V) on the same As-built drawing.

D. After approval by the Owner, submit the test results in .PDF or mutually acceptable format by the Contractor and Owner.

- E. Advanced Structured Cabling System Warranty Certificate

1.6 WARRANTIES

- A. Provide manufacturer warranties as required in Division 27 Section "Structured Cabling System".

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 1. Layout Responsibility: Preparation of Shop Drawings and cabling administration Drawings.
 2. Installer must be trained and certified in the selected cabling system. The contractor has the option of proposing 1 of 3 manufacturers; Commscope, Panduit or Belden.
 3. Installer must be a certified Value-Added Reseller (VAR) of selected cabling manufacturer.
 4. Upon completion of the project, contractor must provide ownership with the cabling system warranty certificate of selected cabling system.

1.8 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

1.9 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system must comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.
- B. Telecommunications Pathways and Spaces: Comply with TIA-569-D.
- C. Grounding: Comply with TIA-607-B.

1.10 GENERAL CABLE CHARACTERISTICS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:
 1. Communications, Plenum Rated: Type CMP in listed cable routing assembly "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 2. Communications, Indoor-Outdoor Rated: listed for use indoors in the environment in which it is installed, rated for installation in wet conduit environment. Use where cabling is installed below grade, in slab floor boxes.
- B. RoHS compliant.

1.11 CATEGORY 6A UNSHIELDED TWISTED PAIR CABLE (INDOOR)

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6A cable at frequencies up to 500MHz.
- B. Standard: Comply with TIA-568-C.2 for Category 6A cables.
- C. Conductors: 100-ohm, 23 AWG solid copper minimum.
- D. Cable Rating: Rated for environment.
- E. Jacket: See Equipment Schedule on Drawings.

1.12 CATEGORY 6A UNSHIELDED TWISTED PAIR CABLE (INDOOR/OUTDOOR)

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6A cable at frequencies up to 500MHz.
- B. Standard: Comply with TIA-568-C.2 for Category 6A cables.
- C. Conductors: 100-ohm, 23 AWG solid copper minimum.
- D. Cable Rating: Rated for environment.
- E. Jacket: See Equipment Schedule on Drawings.

1.13 UNSHIELDED TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate unshielded twisted pair copper communications cable.
- B. General Requirements for Twisted Pair Cable Hardware:
 - 1. Comply with the performance requirements of Category 6A.
 - 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
 - 3. Cables must be terminated with connecting hardware of same category or higher.
- C. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
- D. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.
 - 1. Features:
 - a. Universal T568B wiring labels.
 - b. Labeling areas adjacent to conductors.
 - c. 24 and 48 ports.
 - 2. Construction: 16-gauge steel and mountable on 19-inch equipment racks.

- E. Patch Cords: Factory-made, four-pair cables terminated with an eight-position modular male plug at each end.
 - 1. Patch cords must have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords must have latch guards to protect against snagging.

- F. Plugs and Plug Assemblies - Modular Plug Terminated Link (MPTL):
 - 1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
 - 2. Category-6A MPTL Mandatory For All Wi-Fi antennas and for cameras.
 - 3. Standard: Comply with TIA-568.2D.
 - 4. MPTL Field Terminated male plugs are acceptable for the Wi-Fi antennas and CCTV camera devices only. All other field terminations must be via 8-position RJ-45 female jack and biscuit or faceplate.

- G. Jacks and Jack Assemblies:
 - 1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
 - 2. Designed to snap-in to a patch panel or faceplate.
 - 3. Standard: Comply with TIA-568-C.2.

- H. Faceplate:
 - 1. Single and Multi-port vertical single gang faceplates designed to mount to single gang wall boxes.
 - 2. Refer to Drawings for additional information.

PART 2 - EXECUTION

2.1 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

- A. Comply with TIA 568.

- B. Wiring Method: Install cables in raceways and wire-mesh cable trays, and J-Hook Supports Conceal raceway and cables, except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for raceways and boxes specified in Section 270528 "Pathways for Communications Systems."

- C. General Requirements for Cabling:
 - 1. Comply with TIA-568-C.1.
 - 2. Install 110-style IDC termination hardware unless otherwise indicated.
 - 3. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
 - 4. Terminate all conductors; no cable must contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.

5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. In the communications equipment room, install a 10-foot (3m) long service loop on each end of cable.

D. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.

2.2 FIRESTOPPING

- A. Comply with requirements in Section 07 84 13 "Penetration Firestopping."
- B. Comply with TIA-569-D, Annex A, "Firestopping."
- C. Comply with "Firestopping Systems" Article in BICSI's "Telecommunications Distribution Methods Manual."

2.3 GROUNDING

- A. Comply with TIA-607-B
- B. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

2.4 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-B. Comply with requirements for identification specified in Section 27 05 53 "Identification for Communications Systems."
- B. Cable and Wire Identification:
 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 2. Each wire connected to building-mounted devices is not required to be numbered at the device if wire color is consistent with associated wire connected and numbered within panel or cabinet.
 3. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

2.5 FIELD QUALITY CONTROL

- A. Data for each measurement must be documented. Data for submittals must be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's

"Telecommunications Distribution Methods Manual," or must be transferred from the instrument to the computer, saved as text files, printed, and submitted.

- B. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- C. Testing Criteria:
 - 1. Perform all 6A cable testing per the requirements identified in ANSI/TIA-568-C.2
 - 2. Testing must be performed on 100% of all cabling links and all results must show a "PASS" Result.
 - 3. Provide an electronic record of a successful permanent link test utilizing a Level III tester testing attenuation/insertion loss, NEXT and PSNEXT loss, ELFEXT/PSELFEXT, and return loss, permanent link.
 - 4. Meter must have a valid proof of current calibration documentation.
 - 5. Testing Documentation must be submitted electronically in Adobe PDF format and in the Raw Test equipment format.
- D. Record Document Requirements:
 - 1. As part of the required structured cabling work, a complete set of "as-built" or record structured cabling drawings must be made up and delivered to Ownership.
 - 2. The drawings must show:
 - a. All structured cabling work installed exactly in accordance with the original design.
 - b. All structured cabling work installed as a modification or addition to the original design.
 - c. The dimensional information necessary to delineate the exact location of all cabling runs which are to be untraceable by inspection through the regular means of access established for inspection and maintenance.
 - d. The labeling information necessary to correlate all structured cabling outlets to the patch panel, to which they are connected.
 - e. The location of all Wireless Access Points (WAP's).
 - 3. One set of all as-built drawings will be made available in Revit or AutoCAD, version 2021 or more current, for the exclusive purpose of producing "as-built" drawings.
 - 4. Provide and install (1) hard copy of the "as -built" station ID plan document at each IDF. This includes a laminated copy of each office area secured to the cabinet door.
 - 5. The as-built documents must be completed (4) weeks prior to move-in and forwarded ownership for review.

END OF SECTION 27 15 13