

SECTION 27 15 13  
COMMUNICATIONS HORIZONTAL TWISTED PAIR CABLING  
Construction Specification

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes: Horizontal Twisted Pair Cabling (subsystem of Telecommunications Cabling Infrastructure)
- B. Related Sections
  - 1. Comply with the Related Sections requirements of Section 270000
  - 2. 270811 Communication Twisted Pair Testing
  - 3. 271313 Communication Backbone Twisted Pair Cabling

**1.2 REFERENCES**

- A. Comply with the 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 255, "Standard Method of Test of Surface Burning Characteristics of Building Materials", 2006
    - b. NFPA 259, "Standard Test Method for Potential Heat of Building Materials", 2003
    - c. 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 1863, "Communications-Circuit Accessories"
  - 3. Insulated Cable Engineers Association (ICEA):
    - a. ICEA S-102-700-2004, "ICEA Standard For Category 6A Individually Unshielded Twisted Pair Indoor Cables (With Or Without An Overall Shield) For Use In Communications Wiring Systems Technical Requirements"

**1.3 DEFINITIONS**

- A. Refer to Section 270000 for Definitions.
- B. In addition, define the following list of terms as used in this specification as follows:
  - 1. "CAT6A": Category 6A [UTP] performance grade
  - 2. "Channel": End to end transmission path; e.g., the entire portion of the horizontal cabling to each outlet consisting of the Permanent Link, line cord (at the workstation), patch cord, and, if a full crossconnection is implemented, the crossconnect termination/connecting apparatus and equipment cord.
  - 3. "CMP": Communications Media Plenum [NEC plenum rating]
  - 4. "FEP": Fluorinated Ethylene Propylene
  - 5. "FTP": Foiled Twisted Pair

6. "PE": Polyethylene
7. "Permanent Link": Test configuration for a horizontal cabling link excluding patch cords, equipment cords, and line cords; e.g., the 'permanent' portion of the horizontal cabling to each outlet consisting of cable, consolidation point (if used), termination/connecting apparatus in the telecommunications and the connector at the outlet.
8. "PVC": PolyVinyl Chloride
9. "UTP": Unshielded Twisted Pair

#### 1.4 SYSTEM DESCRIPTION

##### A. Work Covered Under Other Sections

1. Pathways: The communications pathways (basketway, conduits, stubs, etc.) work will be covered under another Section. Refer to the contract drawings for size/capacity and route information.
2. Rooms: Build out (e.g., backboards, overhead and vertical cable runway, etc.) of the telecommunications rooms will be covered under another Section. Refer to the contract drawings for build out information.
3. Connecting Media: Patch cords in the IDFs between horizontal field and network equipment (e.g., access switch.), patch/line cords at the work areas between outlet and user equipment (e.g., phone, computer, etc.).

##### B. Base Bid Work

1. Provide engineering, labor, materials, apparatus, tools, equipment, and transportation required to make a complete working communications Horizontal Twisted Pair Cabling System installation described in this Section and shown on related drawings. Consider Horizontal Cabling as shown on contract drawings as base bid work, unless otherwise noted. This includes terminations at both ends.
2. In general, the base bid work includes:
  - a. Submittals
  - b. Horizontal cables, terminations, and outlets
  - c. Cable management
  - d. Patch cords and crossconnections
  - e. Cable identification tags and system labeling
  - f. Record Documents
  - g. Warranty

##### C. Jack Wiring: T568B

#### 1.5 SUBMITTALS

- A. Comply with the Submittals article of Section 270000 for procedural, quantity, content, and format requirements.
- B. Substitutions
  1. Conform to substitutions requirements and procedure in Section 270000.
- C. Submittal Requirements at Start Of Construction:
  1. Product Data Submittal, indicating conformance with NEC, UL, TIA/EIA listings, certifications and specifications.
  2. Sample Submittal, consisting of the following components:

- a. Standard Outlet Sample – one fully configured outlet including faceplate, modular jacks, and label
  - b. Cable Label Sample
  3. Schedule Submittal, consisting of proposed schedule of work. This schedule may be combined with the schedule developed for 27xxxx series Sections
  4. Shop Drawings Submittal, consisting of proposed changes to cable routing, or termination locations/configurations
- D. Submittal Requirements at Closeout:
1. As-Built Drawings
  2. Cable ID –to– Office Number Key: Submit a “cable ID-to-Office number key” as an electronic file in an MS-Excel spreadsheet file format containing a list of every cable identifier associated with the final office number
  3. Crossconnection records/cut sheets
  4. O & M Manuals
- E. Posted Documentation
1. Post one full size plot of as-built drawings, specifically the floor plans and (as applicable) reflected ceiling plans, within IDF's such that show the IDF's serving area. Coordinate location with Owner.
- 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 a “Panduit Certified Systems Integrator (PCSI)”, and capable of providing an “Integrity” 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 the Delivery, Storage and Handling requirements of Section 270000.
- 1.8 WARRANTY
- A. The horizontal cabling system, as specified in this section, shall carry a “Certification Plus System Warranty” supporting applicable cabling systems.

## PART 2 PRODUCTS

### 2.1 Manufacturers

- A. Panduit cabling system (no other substitutions allowed)

### 2.2 HORIZONTAL CABLE – CAT6A PLENUM (CMP) RATED

- A. Application: Suitable for indoor installation, within ceiling space in primary and secondary pathways, within access/raised floor space.
- B. Conductors:
  1. Insulated Conductors: 23 AWG solid copper, fully insulated with a flame-retardant thermoplastic material (material = FEP, or equivalent).
  2. Twisted Pairs: Two insulated conductors “twisted” into a “pair” (twisted pair) with individually color-coded twisted pairs to industry standards (ANSI/ICEA Publication S-80-576-1994, and EIA-230).

- C. Cable Sheath:
  - 1. Outer Jacket: seamless outer jacket (material = LS-PVC, or similar) applied to and completely cover the internal components (twisted pairs).
  - 2. Flame Rating: NEC (Article 800) rated as CMP, and UL listed as such.
- D. Electrical Performance: Meet or exceed ANSI/TIA-568-C.2 and ISO/IEC 11801 requirements for CAT6A UTP cabling.
- E. Manufacturer:
  - 1. Panduit
    - a. # PUP6AHD04BU-G; CAT6A 4 pair UTP cable "TX6000", CMP, blue

### 2.3 MODULAR PATCH CORDS – CAT6A RATED

- A. Application: Suitable for indoor installation within a telecommunications room or workstation environment.
- B. Cords shall be factory-assembled from a single, continuous length (no splices permitted) of cordage, homogenous in nature, and terminated at both ends via 8 position modular plugs.
- C. Cordage
  - 1. Insulated Conductors: 24 AWG stranded copper, fully insulated with a flame-retardant thermoplastic material (such as PVC, or equivalent).
  - 2. Twisted Pairs: Two insulated conductors "twisted" into a "pair" (twisted pair), and individually color coded.
  - 3. Unshielded sheath and flame-retardant polyvinyl chloride (PVC) jacketed.
  - 4. Flame Rating: NEC CM (or higher) rated, and UL listed as such.
- D. Electrical Performance: Meet or exceed ANSI/TIA-568-C.2 and ISO/IEC 11801 requirements for CAT6A UTP cabling.
- E. Manufacturer:
  - 1. Panduit
    - a. #UTPSPxc; ("x" varies for length, "y" varies for color)

### 2.4 TERMINATION APPARATUS – DISCRETE PORT PATCH PANEL

- A. Application: Panels shall be suitable for installation within a telecommunication room (IDF) for the termination of the horizontal cables specified herein. Discrete patch panels shall be horizontally oriented for a rack-mounted configuration. Panels shall be capable of supporting, organizing, labeling and patching/crossconnecting between the horizontal termination field and network equipment or the equipment termination field.
- B. Each port shall accept one modular connector (8-position jack).
- C. Manufacturer:
  - 1. Panduit
    - a. # CPPL24M6BLY; Patch Panel, 24 Discrete Ports

### 2.5 HORIZONTAL CABLE SUPPORT BAR

- A. Application: Suitable to support horizontal cables behind patch panels from vertical cable managers to termination point.
- B. Color: Match rack.
- C. Manufacturer

1. Panduit

- a. #SRBCT; 'straight' strain relief bar with cable tie clips

## 2.6 MODULAR CONNECTOR / 8-POSITION JACK – CAT6A RATED

- A. Application: Modular connectors (jacks) for termination of 4-pair UTP cables; modular connectors shall be compatible with the 4-pair cables specified herein this section both electrically and physically.
- B. Mechanical Performance: Modular jacks shall be 8-position, compliant to ANSI/TIA-568-C.2.
- C. Electrical Performance: Each jack shall meet or exceed TIA/EIA-568-C.2 and ISO/IEC 11801 requirements for CAT6A UTP cabling.
- D. Manufacturer:

1. Panduit

- a. #CJS6X88TGY; CAT6A 8-position jack "Mini-Com" series "TX6 Plus", Black
    - b. #CJ6X88TGOR; CAT6A 8-position jack "Mini-Com" series "TX6 Plus", Orange
    - c. #CJ6X88TGGR; CAT6A 8-position jack "Mini-Com" series "TX6 Plus", Green
    - d. #CJ6X88TGYL; CAT6A 8-position jack "Mini-Com" series "TX6 Plus", Yellow
    - e. #CJ6X88TGVL; CAT6A 8-position jack "Mini-Com" series "TX6 Plus", Violet
    - f. #CJ6X88TGBU; CAT6A 8-position jack "Mini-Com" series "TX6 Plus", Blue
    - g. #CJX88TGWH; CAT 6A 8-position jack "Mini-Com" series "TX6 Plus", White

## 2.7 WORK AREA OUTLETS

- A. Faceplates for Standard Flush-Mount Outlets

1. Application: Faceplates shall be suitable for indoor installation for standard 1-gang and 2-gang flush-mount devices.
  2. Faceplates shall have 2, 4, or 6 ports, and shall include required accessories, such as icons, blank inserts, label windows and labels.
  3. Color: White (verify with architect to match project requirements)
  4. Manufacturer:
    - a. Panduit
      - 1) #CFPE1WH; faceplate, "Executive" series, 1-gang, vertical, 1 port, white
      - 2) #CFPE2WH; faceplate, "Executive" series, 1-gang, vertical, 2 ports, white
      - 3) #CFPE4WH; faceplate, "Executive" series, 1-gang, vertical, 4 ports, white
      - 4) #CFPE6WH; faceplate, "Executive" series, 1-gang, vertical, 6 ports, white

- B. Faceplate for Wall Phone Outlets

1. Application: Faceplates shall be suitable for indoor installation for standard 1-gang flush-mount device equipped with 1 modular jack and two mounting studs for standard wall-mount telephones.
  2. Faceplates shall include required accessories, such as icons, blank inserts, label windows and labels.
  3. Color: Finish shall be stainless steel.
  4. Manufacturer:
    - a. Panduit

- 1) #KWP6PY, wall phone faceplate, stainless steel, with CAT6A jack
- C. Faceplates for Modular Furniture Mount Outlets
1. Four port faceplates for modular furniture that fits into furniture systems opening.
  2. Color: Match furniture system
  3. Manufacturer
    - a. Panduit
      - 1) #CFFP4BL, fourplex furniture faceplate
      - 2) #MFFPHMBL, adapter for Herman Miller furniture
- D. Outlet Frame for Modular Furniture, Floor Box, Wall-Mount and other miscellaneous applications.
1. Color: White (verify with architect to match project requirements)
  2. Manufacturer:
    - a. Panduit
      - 1) #CF1062WH; outlet frame duplex "106" style, 1-gang, 2 port, White
      - 2) #CF1064WH; outlet frame duplex "106" style, 1-gang, 4 port, White
    - b. Panduit
      - 1) #
      - 2) #CFG2WH; outlet frame Decora style, 1-gang, 2 ports, White
      - 3) #CFG4WH; outlet frame Decora style, 1-gang, 4 ports, White
- E. Surface Outlets
1. Application: Surface outlets shall be suitable for indoor installation for surface-mount device and shall be fully compatible with the specified modular connectors/jacks.
  2. Color: White
  3. Manufacturer:
    - a. Panduit
      - 1) #CBX4WH-A; surface outlet box, "Mini-Com" series, 4 port, white
      - 2) #CBX2WH-AY; surface outlet box, "Mini-Com" series, 2 ports, white
- F. "Poke-Thru" Floor Outlets
1. Adapters that are fully compatible with both the "poke-thru" type floor outlets and the specified connectors / connector accessories.
  2. Manufacturer:
    - a. Wiremold
      - 1) #CM2-U2KEYA; bezel adapter, accepts 2 'keystone' mount connectors
      - 2) #CM2-U1KEYA; bezel adapter, accepts 1 'keystone' mount connectors.
- G. Bezel Adapters
1. Adapters fully compatible with Wiremold's "Open Systems" devices and Panduit Mini-Com connectors.
  2. Manufacturer:

- a. Panduit
    - 1) #CHI2MEI-X; bezel adapter, 2 port, accepts Mini-Com connectors
  3. Adapters fully compatible with Wiremold's "Ortronics Systems" devices and Panduit Mini-Com connectors.
  4. Manufacturer:
    - a. Panduit
      - 1) #CH02MEI-X; bezel adapter, 2 port, accepts Mini-Com connectors
  - H. Faceplates for Furniture Feeds
    1. Application: Suitable for indoor installation for standard 1-gang flush-mount device box with round opening allowing cables to freely exit (towards furniture system entry).
    2. Color: White (verify with architect to match project requirements)
    3. Manufacturer:
      - a. Leviton
        - 1) # 80704-4; faceplate with 1.4" round opening
- 2.8 COURTESY/CAMPUS PHONE
- 2.9 Refer to Construction Specification 27 50 00 Area of Refuge Labels
- A. Labels shall be machine printable with a laser printer, ink jet printer, thermal transfer printer, or hand-held printer.
  - B. Labels for Horizontal Cables
    1. Adhesive backed labels and self-laminating feature.
    2. Fit the horizontal cables listed above (i.e., shall fully wrap around the cable's jacket).
    3. Size: 2"x.05" printable area, minimum
    4. Color: white
    5. Manufacturer:
      - a. Panduit
        - 1) #S100X150YAJ; labels for cable diameters 0.16"-0.32", white, desktop printer (laser or ink jet)
      - b. Or equal
  - C. Outlet Faceplate and Port Labels
    1. Labels shall be adhesive backed.
    2. Port labels shall fit above the port without overlap to the next port or to the port itself.
    3. Manufacturer:
      - a. Panduit.
        - 1) #C125X030FJJ; "Equipment Room Identifier" label, for laser printer
        - 2) #C061X030FJJ; "Unique Cable Number" label, for laser printer
  - D. Modular Patch Panels
    1. Labels shall be adhesive backed.
    2. Labels shall fit above the port without overlap to the next port or to the port itself.

3. Printable Area: size: 0.61" x 0.33", minimum; color: white.
4. Manufacturer:
  - a. Panduit.
    - 1) #CPPLF-5; laser labels for modular patch panels, white

## 2.10 MISCELLANEOUS COMPONENTS

### A. Velcro Cable Ties

1. Width: .75".
2. Color: Velcro cable ties the same color as the cable to which it is being applied.
3. Manufacturers:
  - a. Panduit "Tak-Ty" series cable ties
  - b. Panduit
    - 1) #HLS-15R-0; black, 15' roll, cut to length.
  - c. Or Equal

### B. Plenum Cable Ties

1. Application: for use in plenum or air handling spaces
2. Color: maroon or other distinctive non-white color
3. Manufacturer:
  - a. Panduit
    - 1) #PLT1M-xxxx
    - 2) #PLT2S-xxxx
    - 3) #PLT3S-xxxx
  - b. Or equal.

## 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 horizontal 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 cable's integrity – both sheath and conductors. Documentation of pre-installation testing is not a close out requirement, and is the responsibility of the Contractor.

### 3.3 INSTALLATION

#### A. Cable Installation and Routing

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



2. Place cables within designated pathways, such as cable tray, basketway, cable hangers, etc. Do not fasten (such as with cable ties) or attach cables to other building infrastructure (such as ducts, pipes, conduits, etc.), other systems (such as ceiling support wires, wall studs, etc.), or to the outside of conduits, cable trays, or other non-approved pathway systems.
  3. Place and suspend cables and conductors during installation and termination in a manner to protect them from physical interference or damage (including paint overspray). Place cables with no kinks, twists, or impact damage to the sheath. Replace cables damaged during installation or termination at no additional cost.
  4. No cable length shall exceed 90 meters from the termination point in the IDF to the termination point at the work area (permanent link).
  5. Route cables at 90-degree angles, allowing for bending radius, along corridors for ease of access.
  6. Do not exceed manufacturer's limits for pulling tension.
  7. Do not use cable-pulling compounds for indoor installations.
  8. Maintain a minimum bend radius of 6 times the cable diameter during and after installation.
  9. Route cables under building infrastructure (such as ducts, pipes, conduits, etc.); Do not route cables over building infrastructure. The installation shall result in easy accessibility to the cables in the future.
  10. Place cables 6", minimum, away from power sources to reduce interference from EMI.
  11. Place a pull string along with cables where run in pathways and spare capacity in the pathway remains. Tie off ends of the pull string (to prevent the string from falling into the conduit).
  12. Neatly dress and organize cables using designated cable routing facilities, and fasten to support devices via approved tie wraps or Velcro-type straps.
  13. When exiting the primary pathway (such as basketway or cable tray) to the work area, exit via the top of the pathway. Secure the cables to the pathway using an approved cable tie.
- B. Cable Routing and Dressing within the IDF
1. Place cables within the overhead cable support and, when routing vertically, fasten the cables onto wall-mounted vertical cable support every 24 inches on-center using cable ties.
  2. At the rack bay, route cables into the back of the vertical management sections (do not route cables into the front as this space is reserved for patch cords only). Divide the cables equally between both sides of an equipment rack such that a cable does not travel past the midpoint of the rack prior to termination. Dress and cut cables to length required to reach the designated termination point with no excess cable and slack left in the horizontal cable manager, vertical cable manager, and overhead cable support.
  3. Provide 10 feet, minimum, sheathed cable slack – length not to exceed permanent link maximum length requirement. Place the slack in the overhead cable support.
- C. Termination in the IDF
1. Provide termination apparatus and accessories required for a complete installation. Install and assemble termination apparatus, accessories and associated management apparatus according to the manufacturer's instructions.

2. Properly strain relieve cables to and at termination points per manufacturer's instructions.
  3. Terminate cables and twisted pairs in accordance with manufacturer's latest installation requirements and ANSI/TIA-568-C.0 standard installation practices. Terminate cable pairs onto the termination apparatus. Terminate twisted pairs compliant to ANSI/TIA-568-C.0 and wired per 1.04 System Description.
  4. Discrete Port Patch Panels and Horizontal Management Panels
    - a. Provide quantity of discrete port patch panels to support termination of cables served from respective IDF. Provide quantity of horizontal management panels based on the quantity of patch panels.
    - b. Install and assemble discrete port patch panels and horizontal management panels according to the manufacturer's instructions.
    - c. Install the patch panels and the horizontal management panels as shown on the contract drawings. If configuration is not shown, install the patch panels in association with the horizontal management panels such that a management panel is mounted above and below given patch panel.
  5. Termination Sequence
    - a. Terminate the cables in sequential order using the link's identifier starting at the top left and completing a panel before moving to the next panel below.
- D. Cable Routing and Dressing at the Work Areas
1. Provide 2-4 feet, minimum, sheathed cable slack – length not to exceed permanent link maximum length requirement. Place the slack <within ceiling space neatly on a cable hanger.
  2. Routing to Furniture-Mount Faceplates
    - a. Route cables from primary or secondary pathway within ceiling through the furniture-feed pathway (stub within wall) into opening at bottom of furniture. Exercise caution to prevent scraping, cutting, or other damage to cable's jacket.
    - b. Provide spiral wrap around cables from furniture-feed pathway to point where cables enter furniture.
- E. Termination at the Work Areas
1. Provide device components, connectors, and accessories required for a complete installation. Install and assemble connectors, jacks, adapters, termination apparatus, accessories and associated management apparatus according to the manufacturer's instructions.
  2. Provide six inches, minimum, sheathed cable slack behind each workstation outlet faceplate. Coil the slack cable inside the raceway, within the wall, or in the junction box (if used), per the cabling manufacturer's installation standards.
  3. Wall-Mount Faceplates
    - a. Install devices at heights shown on the contract drawings.
    - b. Mount faceplates plumb, square, and at the same level as adjacent device faceplates.
    - c. Patch gaps around faceplates so that faceplate covers the entire opening.
  4. Furniture-Mount Faceplates
    - a. Coordinate installation of faceplate adapters with the furniture contractor, including color.



- a. First field: the originating room identifier; for example: "TDA".
  - b. Second field: the destination room number; for example: "101".
  - c. Third field: the cable/port number in the outlet; for example: "1A".
  - d. Example: "TDA-101-1A"
3. Outlets
    - a. First field: the originating room identifier; for example: "TDA".
    - b. Second field: the destination room number; for example: "101".
    - c. Example: "TDA-101"
  4. Individual Ports at the Outlets
    - a. First field: the cable/port number in the outlet; for example: "1A".
  5. Individual Ports at Patch Panels
    - a. First field: the destination room number; for example: "101".
    - b. Second field: the cable/port number in the outlet; for example: "1A".
    - c. Example: "101-1A"

### 3.5 FINAL INSPECTION AND CERTIFICATION

- A. Punch the Work of this Section compliant to the requirements of Section 270000.
- B. Remove cables and replace with new those failing to meet the indicated standards and not passing the testing requirements of Section 270811 with no impact to cost and schedule. The Owner's Representative, will not accept the installation until testing has indicated a 100% availability of all cables and conductors. Any deviation from this requirement must be approved in writing by the Owner's Representative.
- C. Comply with system acceptance and certification requirements of Section 270000.

END OF SECTION