

**SECTION 17110
TELECOMMUNICATIONS ROOM AND SPACES**

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, materials, tools, and equipment required for the complete installation of work called for in the Contract Documents
- B. The Telecommunications Room/Closet (TR/TC) is generally considered to be a floor serving facility. The Horizontal Cross-connect links the Horizontal cable and the Backbone Cable together. The Horizontal Cross-connect shall consist of rack or wall mounted wiring blocks or panels for termination of copper cables or rack or wall mount interconnect termination units or fiber management panels/trays for the termination of optical fibers. Cross-connect spaces include the labeling of hardware for providing circuit identification and patch cords or cross-connect wire used for creating circuit connections at the cross-connect.

1.2 SCOPE

- A. This section includes the minimum requirements for equipment, termination hardware and cable installations in communication equipment rooms.
- B. The telecommunications room shall be equipped to contain telecommunications equipment, cable terminations, and associated cross-connects.
- C. Minimum composition requirements and installation methods for the following:
 - 1. Floor Mounted Relay Racks
 - 2. Wall Mounted Relay Racks and Brackets
 - 3. Floor Mounted Cabinets
 - 4. Cable Management Hardware
 - 5. Cable Supports/Ladder Rack
 - 6. Patch Panels - Category 6
 - 7. Fiber optic panels - rack mount (low fiber count)
 - 8. Fiber optic panels/frames- rack mount (moderate fiber count)
 - 9. Back Boards
 - 10. 66 System Blocks
 - 11. Cross Connect Wire
 - 12. Grounding Bars

 - 13. Optical Fiber Patch Cords
 - 14. Patch Cords - UTP Category 6

1.3 QUALITY ASSURANCE

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- A. All equipment rooms shall be installed in a neat and workmanlike manner.
- B. All methods of construction that are not specifically described or indicated in the Contract Documents shall be subject to the control and approval of **Verizon**.
- C. Equipment and materials shall be of the quality and Manufacturer indicated.
- D. The equipment specified is based on the acceptable manufacturers listed.
- E. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified, and subject to approval.
- F. Separation from sources of EMI shall be as specified in section.
- G. Communication grounding/earthing and bonding shall be in accordance with applicable codes and regulations. It is recommended that the requirements of IEC 1000-5-2, ANSI/TIA/EIA-607, or both be observed throughout the entire cabling system
- H. Materials and work specified herein shall comply with the applicable requirements of:
 - 1. EIA/TIA-568-A.
 - 2. EIA/TIA-569-A
 - 3. EIA/TIA-606
 - 4. EIA/TIA-607
 - 5. Underwriters Laboratory
 - 6. Federal Communications Commission (including CFR 47 and Part 68 - subpart F)
 - 7. National Electric Code
 - 8. Local and State Codes
 - 9. ISO/IEC 11801
 - 10. IEC 1000-5-2
 - 11. CSA C22.2
 - 12. IEC 60603-7

1.4 CONTRACTOR QUALIFICATIONS AND TRAINING

- A. The Certified Contractor shall have a full working knowledge of cabling low voltage applications such as, but not limited to data, voice and imaging network systems. The Certified Contractor shall have the following qualifications:
- B. Possess those licenses/permits required to perform telecommunications installations in the specified jurisdiction.
- C. Have personnel trained and certified in the design and installation of the AMP Structured Connectivity System or Siemon Structured Connectivity System.
- D. The Contractor shall show proof of current certification of the Structured Connectivity System by providing Registration number and or copy of certification.
- E. Provide references of the type of installation provide in this specification.
- F. Have personnel trained and certified in optic fiber cabling, splicing, termination and testing techniques.

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- G. Personnel must have experience using a light meter and OTDR.
- H. Have personnel trained in the installation of pathways and support for housing horizontal and backbone cabling.
- I. Have personnel knowledgeable in local, state, and national codes and the latest TIA Telecommunications Standards and Manufacturer's recommendations.
- J. Be in business a minimum of five (5) years.
- K. Have personnel fluent in the use of Computer Aided Design and possess and operate CAD software using .DWG or .DXF and .VSD format.

1.5 SUBMITTALS

- A. Provide product data for the following:
 - 1. Horizontal Support Material (Outside that of provided cable tray)

PART 2 - PRODUCTS

2.1 FLOOR MOUNTED RELAY RACKS

- A. Racks shall meet the following physical specifications:
 - 1. 19" rack mounting space.
 - 2. 7 foot high.
 - 3. Lightweight, high strength aluminum construction.
 - 4. Clear coat finish .
 - 5. 15" deep base with four (4) ¾" bolt down holes.
 - 6. EIA Channel width of 3.0", with #12-24 screw holes
- B. Rack shall have double sided 12/24 tapped holes and EIA universal rack 5/8" to 5/8"- ½" standard hole pattern (compatible with 1 1/4" - ½" hole patterns)
- C. Design Make: CPI 55053-503
- D. Acceptable Manufacturers:
 - a) CHATSWORTH PRODUCTS INC.

2.2 CABLE MANAGEMENT - FOR RELAY RACKS

- A. Cable management shall be black with integral wire retaining fingers.
- B. Vertical cable management panels shall have front and rear channels.
- C. Vertical cable management panels shall have removable front and back covers, made of black . Vertical management shall be placed between adjoining relay racks and at the ends of relay racks.
- D. A horizontal crossover cable manager shall be provided at the bottom of each 48 port Patch Panel, with a minimum height of 2 rack units.

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- E. Design Make: Panduit
 - 1. PANDUIT: Vertical Management WMPVC45 between racks
 - 2. PANDUIT: Vertical Management WMPVS45 end of racks
 - 3. PANDUIT: Horizontal Management WMP1
- F. Acceptable Manufacturers
 - a) AMP
 - b) SIEMON
 - c) PANDUIT

2.3 PATCH PANELS - CATEGORY 6

- A. Be made of a steel frame with black power coat finish in 48-port configurations.
- B. Accommodate at least 24 ports for each rack mount space (1rms = 44.5 mm [1.75 in.]).
- C. Have circuit boards tested in both directions as required by ANSI/TIA/EIA-568-A and ISO/IEC 11801.
- D. Support applications up to 250 MHz
- E. Have Category 6 jacks available in both T568A and T568B wiring schemes, with 110-style termination.
- F. Have 110 style insulation displacement contacts and termination accomplished with a single conductor impact tool or 4 or 5 pair impact tool.
- G. Be backwards compatible to allow lower performing categories of cables or connecting hardware to operate to their full capacity.
- H. ANSI/TIA/EIA-568-A and ISO/IEC 11801 proposed Category 6 channel compliant.
- I. Design Make: AMP Quantum 1116028-1 or Siemon HD6 HD6-48.
- J. Acceptable Manufacturers
 - a) AMP
 - b) SIEMON

2.3A PATCH PANELS - VOICE

- A. Be made of a steel frame with black power coat finish in 48-port configurations.
- B. Accommodate at least 24 ports for each rack mount space (1rms = 44.5 mm [1.75 in.]).
- C. Have circuit boards tested in both directions as required by ANSI/TIA/EIA-568-A and ISO/IEC 11801.
- D. Support applications up to 250 MHz
- E. Have RJ45 jacks available in both T568A and T568B wiring schemes
- F. Be backwards compatible to allow lower performing categories of cables or connecting hardware to operate to their full capacity.
- G. Design Make: AMP 555482-21 WITH Siemon A25B-SE-25.
- H. Acceptable Manufacturers

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- a) AMP
- b) SIEMON

2.4 FIBER OPTIC PANELS - RACK MOUNT (LOW FIBER COUNT)

- A. All panels and trays (units) shall provide cross-connect, inter-connect, splicing capabilities and contain cable management for supporting and routing the fiber cables/jumpers.
- B. Shall be available in 48 port with no splicing.
- C. Allow mounting in either 19" bay.
- D. Allow flush mounting.
- E. Be available in black.
- F. Shall meet or exceed all TSB-72 requirements.
- G. Provide port configurations and densities as called for on drawings.
- H. Shall be rack mountable.
- I. Shall have a front cover.
- J. Shall feature a front access design.
- K. Shall house 6 adapter per adapter plate.
- L. Design Make: AMP 5589614-2 or SIEMON RIC24-F-01
- M. Acceptable Manufacturers
 - a) AMP
 - b) SIEMON

2.5 FIBER OPTIC PANELS/FRAMES - RACK MOUNT (MODERATE FIBER COUNT)

- A. All panels and trays (units) shall provide cross-connect, inter-connect, splicing capabilities and contain cable management for supporting and routing the fiber cables/jumpers.
- B. Shall be available in 72 port configurations.
- C. Feature a front access design.
- D. Use adapter plates that house 6 adapters each.
- E. Have a hinged front cover.
- F. Be mountable in flush, 1"2" and 5" recess options.
- G. Be 19" rack mountable.
- H. Provide port configurations and densities as called for on drawings.
- I. Design Make: AMP 559552-2 or SIEMON RIC72-F-01.
- J. Acceptable Manufacturers
 - a) AMP

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b) SIEMON

2.6 BACKBOARDS

- A. Shall be 4 x 8 x $\frac{3}{4}$ " ACX or BCX, exterior grade, fire rated plywood, **Shall be provided by Division 16 Contractor.**
- B. Provide adequate support and dress horizontal cabling between ladder rack and wiring blocks as necessary or as shown on the drawings. Review cable routing plan for the Telecommunications Rooms, in the field, before installation of cabling commences.
- C. Design Make: **OPEN**
- D. Acceptable Manufacturers

a) **OPEN**

2.7 66 SYSTEM BLOCKS

- A. The connecting hardware block shall support the appropriate category 3, applications and facilitate cross-connection and/or inter-connection using approved cross-connect wire.
- B. Be UL VERIFIED or equivalent for TIA/EIA proposed Category electrical performance.
- C. Be UL VERIFIED or equivalent for TIA/EIA proposed Category electrical performance.
- D. Be CSA C22.2 approved or equivalent.
- E. Be made of flame-retardant thermoplastic.
- F. Be available in 25 -pair size.
- G. Shall be mounted on appropriate cross connect frames as per drawings.
- H. Blocks shall include means to identify cables/services per ANSI/TIA/EIA-606.
- I. Support wire sizes: Solid 22-26 AWG (0.64 mm - 0.40 mm), and 7-strand wires.
- J. Design makes:
 - 1. SIEMON 66 Block S66M1-25
 - 2. SIEMON Distribution Frame CC-2024-TB-DC and CC-2014-TB-DC.
- K. Acceptable Manufacturers

a) SIEMON

2.8 OPTICAL FIBER PATCH CORDS - MULTIMODE

- A. Shall be available in standard lengths of 1, 3, and 5 meters, custom lengths shall also be available, and shall meet or exceed standards as defined in ANSI/TIA/EIA-568-A and ISO/IEC 11801.
- B. Utilize duplex optical fiber cable that is 62.5/125 or 50/125 micron multimode, OFNR riser grade, and meets the requirements of UL 1666.
- C. Utilize optical fiber cable where the attenuation shall not exceed 3.5 dB/km @ 850 nm wavelength or 1.0 dB/km @ 1300 nm.
- D. Have a cable jacket color for 62.5/125 in orange.

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- E. Be equipped with SC in accordance with TIA/EIA-568-A
- F. Be UL 1666 approved.
- G. Shall be a duplex fiber cable meeting or exceeding the transmission characteristics of the optical fiber horizontal cable.
- H. Connectors shall be **duplex T568SC**, as specified on the drawings or equipment schedules.
- I. Jackets shall be orange in color for multi-mode connections and yellow for single mode connections.
- J. The following configurations may be required:
 - 1. SC/SC
- K. Design Make: - AMP 504971-Y or SIEMON FJ2-SCSC-MM-XX
- L. Acceptable Manufacturers
 - a) AMP
 - b) SIEMON

2.9 CATEGORY 6 PATCH CORDS

- A. Shall be round, and consist of eight insulated 24 AWG, stranded copper conductors, arranged in four color-coded twisted-pairs within a flame-retardant jacket.
- B. Be equipped with modular 8-position plugs on both ends, wired straight through with standards compliant wiring.
- C. Be backwards compatible with lower performing categories.
- D. Use modular plugs, which exceed FCC CFR 47 part 68 subpart F and IEC 60603-7 specifications.
- E. Have matching color strain relief boot with a snagless design which shall meet the flex testing as called out in 1000 cycles with boots and 100 cycles without boots.
- F. Be resistant to corrosion from humidity, extreme temperatures, and airborne contaminants.
- G. Utilize cable that exhibits power sum NEXT performance.
- H. Be available in any custom length and standard lengths of (3, 5, 7, 10, 15, 20, and 25 feet).
- I. Be 100% transmission tested for performance up to 250 MHz. Manufacturer shall guarantee cords are compatible with proposed Cat-6 links.
- J. Utilize cable that is UL VERIFIED (or equivalent) for TIA/EIA proposed Category 6 electrical performance.
- K. Be UL LISTED 1863.
- L. Design Make: AMP 2198XX-1 SIEMON MC6-8T-XX-BXX OR MC6-8-T-XX-XX
- M. Acceptable Manufacturers
 - a) AMP
 - b) SIEMON

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2.10 LADDER RACK

- A. Provide ladder rack in Telecommunications Room (TR) Support Drawings of proposed Telecommunications Room rack layout.
- B. Include connecting and support hardware to suit installation. Including but not limited to, rack to runway mount plate , wall angle support bracket, connect junction, grounding/bonding kit .
- C. Rack shall be a hollow or solid side bar nominally 3/8" thick by 1 1/2" high with rungs 9" on center.
- D. Design Make: **OPEN**
- E. Acceptable Manufacturers
 - a) **OPEN**

PART 3 - EXECUTION

3.1 FLOOR MOUNTED RELAY RACKS

- A. All racks shall be anchored to the floor.
- B. Provide vertical and horizontal cable as shown on drawing.
- C. Ground the rack to the equipment ground bar with a #6 copper wire.
- D. Communication grounding/earthing and bonding shall be in accordance with applicable codes and regulations. It is recommended that the requirements of IEC 1000-5-2, ANSI/TIA/EIA-607, or both be observed throughout the entire cabling system.

3.2 CABLE MANAGEMENT

- A. A horizontal crossover cable manager shall be provided at the bottom of each 48 Port panel, with a minimum height of 2 rack units each.
- B. Provide reusable velcro-type hook and loop straps in each rear vertical channel. Reusable straps shall be of varying sizes (each allowing 50% spare future expansion) and of adequate quantity to secure cable bundles at least every 4 rack units.
- C. Secure cable managers, slack managers, support bars, hook and loop straps per manufacturer recommendations.

3.3 OPTICAL FIBER PATCH PANELS

- 1. Install as shown on drawings.
- 2. Furnish and Install labels for each strand, as per owner's instruction in the field or as shown on drawings.

3.4 CABLE SUPPORTS

- A. Provide "D" rings on 2 ft. center for all exposed wall mounted vertical cable runs.
- B. Keep horizontal wall mounted cable runs to a minimum. In general horizontal runs shall be on ladder rack.

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- C. Provide cable brackets 3' on center supported to building structure for all cable runs not supported by cable tray.

3.5 BACKBOARDS

- A. Backboards shall be installed by the Division 16 contractor.
- B. In no cases shall the heads of mounting screws protrude past the face of any plywood.
- C. Install distribution rings for the cross-connect fields above all wall mounted blocks. Mount rings with two hex head screws per ring.

3.6 MISCELLANEOUS REQUIREMENTS

- A. All cables shall be neatly "dressed out" in equipment rooms.
- B. Provide service loops on all cables terminated in the telecommunications rooms, per the drawings.
- C. Firestop all sleeves and conduit openings after the cable installation is complete.

3.7 66 SYSTEM BLOCKS

- A. Installed on plywood backboard so that top of the cross connect frame is as noted on the drawing.
- B. Mount frame with steel, zinc plated 5/16" slotted hex head #10 x 3/4" drill screws, minimum four screws frame.

3.8 GROUNDING AND BONDING

- A. Bond all metallic equipment racks, conduits, cable tray, ladder racks, etc. to the ground bar.
- B. All connectors and clamps shall be mechanical type made of silicon bronze.
- C. Terminals shall be solderless compression type, copper long-barrel NEMA two bolt.
- F. Bond the shield of shielded cable to the ground bar in communications rooms and spaces, per applicable code and manufacturers recommended practices.
- D. Communication grounding/earthing and bonding shall be in accordance with applicable codes and regulations. It is recommended that the requirements of IEC 1000-5-2, ANSI/TIA/EIA-607, or both be observed throughout the entire cabling system.

END OF SECTION