

**SECTION 27 10 00.02
STRUCTURED CABLING**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment; 2005e.
- B. FM (AG) - FM Approval Guide; Current Edition.
- C. ICEA S-83-596 - Indoor Optical Fiber Cable; 2021.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.
- F. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices; 1988a (Reaffirmed 2012).
- G. TIA-492AAAA - Detail Specification for 62.5-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; 2009b.
- H. TIA-492AAAB - Detail Specification for 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; 2009a.
- I. TIA-492AAAC - Detail Specification for 850-nm Laser-Optimized, 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; 2009b.
- J. TIA-492AAAD - Detail Specification for 850-nm Laser- Optimized, 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers Suitable for Manufacturing OM4 Cabled Optical Fiber; 2009.
- K. TIA-492CAAA - Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers; 1998 (Reaffirmed 2002).
- L. TIA-492CAAB - Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak; 2000 (Reaffirmed 2005).
- M. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant, Adoption of IEC 61280-4-2 Edition 2: Fibre-Optic Communications Subsystem Test Procedures – Part 4-2: Installed Cable Plant – Single-Mode Attenuation and Optical Return Loss Measurement; 2015a (Reaffirmed 2022).
- N. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; IEC 61280-4.1 Edition 3.1, Fiber Optic Communications Subsystem Test Procedures- Part 4-1: Installed Cable Plant- Multimode Attenuation Measurement; 2023d.
- O. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2024.
- P. TIA-568.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards; 2018d, with Addenda (2020).
- Q. TIA-568.3 - Optical Fiber Cabling and Components Standard; 2022e.
- R. TIA-569 - Telecommunications Pathways and Spaces; 2019e, with Addendum (2022).
- S. TIA-570 - Residential Telecommunications Infrastructure Standard; 2018d.
- T. TIA-598 - Optical Fiber Cable Color Coding; 2014d, with Addendum (2018).
- U. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2021d.
- V. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2019d, with Addendum (2021).
- W. UL (DIR) - Online Certifications Directory; Current Edition.
- X. UL 444 - Communications Cables; Current Edition, Including All Revisions.

- Y. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.
- Z. UL 1651 - Fiber Optic Cable; Current Edition, Including All Revisions.
- AA. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.02 SECTION INCLUDES

- A. Communications system design requirements.
- B. Communications pathways.
- C. Copper cable and terminations.
- D. Fiber optic cable and interconnecting devices.
- E. Communications equipment room fittings.
- F. Communications outlets.
- G. Communications grounding and bonding.
- H. Communications identification.

1.03 REFERENCE STANDARDS

- A. [EIA/ECA-310](#) - Cabinets, Racks, Panels, and Associated Equipment; Revision E, 2005.
- B. FM (AG)- FM Approval Guide; current edition.
- C. [ICEA S-83-596](#) - Indoor Optical Fiber Cables; 2016.
- D. NECA/BICSI 568 - Standard for Installing Commercial Building Telecommunications Cabling; 2006.
- E. [NFPA 70](#) - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. [TIA-455-21](#) - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices; 1988a (Reaffirmed 2012).
- G. [TIA-492AAAA](#) - Detail Specification for 62.5-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; 2009b.
- H. [TIA-492AAAB](#) - Detail Specification for 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; 2009a.
- I. [TIA-492AAAC](#) - Detail Specification for 850-nm Laser-Optimized, 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; 2009b.
- J. [TIA-492AAAD](#) - Detail Specification for 850-nm Laser-Optimized, 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; 2009.
- K. [TIA-492CAAA](#) - Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers; 1998 (Reaffirmed 2002).
- L. [TIA-492CAAB](#) - Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak; 2000 (Reaffirmed 2005).
- M. [TIA-526-7](#) - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant; 2015a.
- N. [TIA-526-14](#) - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; 2015c.
- O. TIA-568 (SET)- Commercial Building Telecommunications Cabling Standard Set; 2019.
- P. [TIA-568.2](#) - Balanced Twisted-Pair Telecommunications Cabling and Components Standards; 2009c, with Addendum (2016).

- Q. [TIA-568.3](#) - Optical Fiber Cabling and Components Standard; 2016d.
- R. [TIA-569](#) - Telecommunications Pathways and Spaces; 2019e.
- S. [TIA-570](#) - Residential Telecommunications Infrastructure Standard; 2012c.
- T. [TIA-598](#) - Optical Fiber Cable Color Coding; 2014d.
- U. [TIA-606](#) - Administration Standard for Telecommunications Infrastructure; 2017c.
- V. [TIA-607](#) - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2019d.
- W. UL (DIR)- Online Certifications Directory; Current Edition.
- X. [UL 444](#) - Communications Cables; Current Edition, Including All Revisions.
- Y. [UL 514C](#) - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.
- Z. [UL 1651](#) - Fiber Optic Cable; Current Edition, Including All Revisions.
- AA. [UL 1863](#) - Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
 2. Coordinate the work to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
 3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 4. Notify Architect/Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Arrange for Communications Service Provider to provide service.
- C. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Communications Service Provider representative.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- C. Shop Drawings:
 1. Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
 2. Shop drawings shall include detailed layout of all fiber optic cable routing. Include where existing conduit shall be reused (including existing conduit routing), new conduit shall be installed, or wireless communication will be installed (if permitted by NYCHA). Shop drawings shall include quantities of all fiber cables, number of strands terminated, and the conduit fill ratio of each conduit.
- D. Evidence of qualifications for installer.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

- F. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.
- G. Field Test Reports.
- H. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
 - 1. Record actual locations of outlet boxes and distribution frames.
 - 2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
 - 3. Identify distribution frames and equipment rooms by room number on drawings.
- I. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents.

1.06 QUALITY ASSURANCE

- A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- B. Manufacturer Qualifications: At least 3 years' experience manufacturing products of the type specified.
- C. Installer Qualifications: A company having at least 3 years' experience in the installation and testing of the type of system specified, and:
 - 1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
 - 2. Supervisors and installers factory certified by manufacturers of products to be installed.
 - 3. Employing BICSI Registered Cabling Installation Technicians (RCIT) for supervision of all work.
- D. Products: Listed, classified, and labeled as suitable for the purpose intended.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- F. Please note: NYCHA reserves the right to update and modify design in accordance with new products and updated design requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a 2 year period after Date of Substantial Completion.
- C. Manufacturer's Warranty: Manufacturer agrees to replace or refund the purchase price of products that fail from defects in material and workmanship within the specified warranty period.
- D. Warranty Period: One (1) year from date of Substantial Completion.
- E. Manufacturer's Extended Warranty: Manufacturer agrees to replace or refund the purchase price of products that are installed by a manufacturer-certified installer that fail from defects in material and workmanship within the specified warranty period.
- F. Warranty Period: Twenty-five (25) years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
 - 1. Comply with TIA-568 (SET)(cabling) and [TIA-569](#) (pathways) (commercial standards).
 - 2. Comply with Communications Service Provider requirements.
 - 3. Provide fixed cables and pathways that comply with [NFPA 70](#) and [TIA-607](#) and are UL listed or third party independent testing laboratory certified.
 - 4. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees Fahrenheit at relative humidity of 0 to 95 percent, noncondensing.
 - 5. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
- B. System Description:
 - 1. Building Entrance Cable: By others.
 - 2. Backbones - Within Building: Fiber Optic.
 - 3. Backbones - Between Buildings: Fiber Optic.
 - 4. Provide additional outlets where indicated on drawings.
- C. Security Operations Center (SOC): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
 - 1. For the entire development there is one Security Operations Center (SOC) and for each building there is a building Low Voltage Center (LVC) that functions as the main distribution frame (MDF) for that building.
 - 2. Locate Security Operations Center (SOC) and Low Voltage Center (LVC) as indicated on the drawings.
Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.
- D. Low Voltage Center (LVC): Support structures for terminating horizontal cables that extend to telecommunications outlets.
 - 1. Locate as indicated on the drawings.
- E. Backbone Cabling: Cabling, pathways, and terminal hardware connecting Low Voltage Center (LVC) with main Security Operations Center (SOC), wired in star topology with Security Operations Center (SOC) at center hub of star.
- F. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.02 PATHWAYS

- A. Conduit: As specified in Section 260533.13; provide pull cords in all conduit.
- B. Cable Trays: As specified in Section 260536.
- C. Underground Service Entrance: Galvanized rigid steel conduit.
- D. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
 - 1. Products:
 - a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: www.holdrite.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.03 COPPER CABLE AND TERMINATIONS

- A. Manufacturers:
 - 1. CommScope: www.commscope.com/#sle.
 - 2. General Cable Technologies Corporation: www.generalcable.com/#sle.
 - 3. Siemon Company: www.siemon.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Provide cables with lead content less than 300 parts per million.
- C. Copper Horizontal Cable:
 - 1. Description: 100 ohm, balanced twisted pair cable complying with [TIA-568.2](#) and listed and labeled as complying with [UL 444](#).
 - 2. Cable Type - Voice and Data: TIA-568.2 Category 6 UTP (unshielded twisted pair); 23 AWG.
 - 3. Cable Capacity: 4-pair.
 - 4. Cable Applications: Use listed [NFPA 70](#) Type CMP plenum cable unless otherwise indicated.
 - 5. Cable Jacket Color - Voice and Data Cable: Blue.
 - 6. Product(s):
 - a. CommScope; SYSTIMAX Twisted Pair Cables; GigaSPEED XL Category 6 U/UTP Cable: www.commscope.com/#sle.
 - b. CommScope; Uniprise Twisted Pair Cables; CS34 Series Category 6 U/UTP Cable: www.commscope.com/#sle.
 - c. General Cable Technologies Corporation; GenSPEED Cables: www.generalcable.com/#sle.
- D. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.
- E. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; [UL 1863](#) listed.
 - 1. Performance: 500 mating cycles.
 - 2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.
 - 3. Product(s):
 - a. CommScope; SYSTIMAX RJ45 Jacks; MGS400 Series Category 6 U/UTP Modular Jacks: www.commscope.com/#sle.
 - b. CommScope; Uniprise RJ45 Jacks; UNJ600 Series Category 6 U/UTP Modular Jacks: www.commscope.com/#sle.
- F. Copper Patch Cords:
 - 1. Description: Factory-fabricated 4-pair cable assemblies with 8-position modular connectors terminated at each end.
 - 2. Product(s):
 - a. CommScope; SYSTIMAX Category 6 U/UTP Patch Cords: www.commscope.com/#sle.
 - b. CommScope; Uniprise Category 6 U/UTP Patch Cords: www.commscope.com/#sle.

2.04 FIBER OPTIC CABLE AND INTERCONNECTING DEVICES

- A. Manufacturers:
 - 1. Corning Optical Communications LLC: www.corning.com/opcomm
 - 2. CommScope: www.commscope.com/#sle.
 - 3. General Cable Technologies Corporation: www.generalcable.com/#sle.
 - 4. Siemon Company: www.siemon.com/#sle.
 - 5. Substitutions: See Section 016000 - Product Requirements.

- B. Provide cables with lead content less than 300 parts per million.
- C. Indoor/Outdoor Tight Buffered Optical Fiber Cables :
 - 1. Description: Tight buffered, non-conductive fiber optic cable complying with [TIA-568.3](#), [TIA-598](#), [ICEA S-83-596](#) and listed as complying with [UL 444](#) and [UL 1651](#).
 - 2. Cable Capacity: Quantity of fibers as indicated on drawings.
 - 3. Cable Applications:
 - a. Plenum Applications: Use listed [NFPA 70](#) Type OFNP plenum cable.
 - b. Riser Applications: Use listed [NFPA 70](#) Type OFNR riser cable or Type OFNP plenum cable.
 - 4. Cable Jacket Color:
 - a. Single-Mode Fiber (OS1/OS2): Yellow.
 - 5. Testing Requirements:
 - a. Temperature Cycling for Tight Buffered and Hybrid Fiber Optic Cables: FOTP-3.
 - b. Storage: -40 °C to 70 °C (-40 °F to 158 °F).
 - c. Riser Installation: 0 °C to 60 °C (32 °F to 140 °F).
 - d. Plenum Installation: -10 °C to 60 °C (14 °F to 140 °F).
 - e. Operation: -40 °C to 70 °C (-40 °F to 158 °F).
 - f. Crush Resistance: FOTP-41.
 - g. Force: 220 N/cm (125 lbf/in).
 - h. Cyclic Flexing: FOTP-104.
 - i. Bending: FOTP-37.
 - j. Impact Resistance: FOTP-25.
 - k. Impact Energy: 4.4 N·m 38.7 inch ·lbf).
 - l. Twisting: FOTP-85.
 - m. Tensile and Fiber Strain: FOTP-33.
 - n. Cables under 18 feet: 660 N (148 lbf).
 - o. Cables over 24 feet: 1320 N (297 lbf).
 - 6. Indoor/Outdoor Tight-Buffered 2- to 24-Fibers Plenum Cables
 - a. Basis of Design Product: FREEDM One Tight Buffered, Plenum, by Corning Optical.
 - b. Plenum Flame and Smoke: Provide cable in compliance with NFPA 262.
 - c. Color: Cable jacket available in up to 12 colors.
 - d. Physical Performance: Provide cable with buffered fibers surrounded by dielectric strength elements, with a flame-retardant jacket in compliance with NEC 770.
 - e. Fiber Count: Two (2) single-layer fibers.
 - f. Fiber Count: Four (4) single-layer fibers.
 - g. Fiber Count: Six (6) single-layer fibers.
 - h. Fiber Count: Twelve (12) dual-layer fibers.
 - i. Fiber Count: Sixteen (16) dual-layer fibers.
 - j. Fiber Count: Twenty-four (24) dual-layer fibers.
 - k. Indoor/Outdoor Fan-Out Tight-Buffered 36- to 144-Fibers Riser Cables.
 - l. Basis of Design Product: FREEDM Fan-Out Tight Buffered, Riser, by Corning Optical.
 - m. Riser Flame and Smoke: Provide cable in compliance with UL 1666.
 - n. Physical Performance: Provide cable with buffered fibers around a dielectric central element, with a flame-retardant jacket in compliance with NEC 770.
 - o. Fiber Count: One (1) fiber.
 - p. Fiber Count: Two (2) fibers.
 - q. Fiber Count: Three (3) fibers.
 - r. Fiber Count: Four (4) fibers.
- D. Fiber Optic Interconnecting Devices:
 - 1. Connector Type: Type LC.
 - 2. Connector Performance: 500 mating cycles, when tested in accordance with [TIA-455-21](#).

3. Maximum Attenuation/Insertion Loss: 0.3 dB.
 4. Product(s):
 - a. CommScope Fiber Optic Connectors; QWIK II-LC Fiber Connectors:
www.commscope.com/#sle.
- E. Fiber Optic Patch Cords:
1. Description: Factory-fabricated 2-fiber cable assemblies with suitable connectors at each end.
 2. Product(s):
 - a. CommScope Fiber Optic Patch Cords; TeraSpeed Fiber Patch Cords:
www.commscope.com/#sle.

2.05 2.05 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- A. A. Copper Cross-Connection Equipment:
1. 1. Manufacturers:
 - a. a. CommScope: www.commscope.com/#sle.
 - b. b. Siemon Company: www.siemon.com/#sle.
 - c. c. Substitutions: See Section 016000 - Product Requirements.
 2. 2. Patch Panels for Copper Cabling: Sized to fit [EIA/ECA-310](#) standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
 - a. a. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
 - b. b. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
 - c. c. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with [TIA-606](#).
 - d. d. Provide incoming cable strain relief and routing guides on back of panel.
 3. 3. Product(s):
 - a. a. CommScope; SYSTIMAX Copper Panels; 360-IPR-1100-XX Series Patch Panels:
www.commscope.com/#sle.
 - b. b. CommScope; Uniprise Copper Panels; UNP-XX-DM Series Patch Panels:
www.commscope.com/#sle.
- B. B. Fiber Optic Cross-Connection Equipment:
1. 1. Manufacturers:
 - a. a. CommScope: www.commscope.com/#sle.
 - b. b. Siemon Company: www.siemon.com/#sle.
 - c. c. Substitutions: See Section 016000 - Product Requirements.
 2. 2. Patch Panels for Fiber Optic Cabling: Sized to fit [EIA/ECA-310](#) standard 19 inch wide equipment racks; 0.09 inch thick aluminum.
 - a. a. Adapters: As specified above under FIBER OPTIC CABLE AND INTERCONNECTING DEVICES; maximum of 24 duplex adaptors per standard panel width.
 - b. b. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with [TIA-606](#).
 - c. c. Provide incoming cable strain relief and routing guides on back of panel.
 - d. d. Provide rear cable management tray at least 8 inches deep with removable cover.
 - e. e. Provide dust covers for unused adapters.
 3. 3. Product(s):
 - a. a. CommScope; SYSTIMAX Fiber Panels; HD Series Patch Panels:
www.commscope.com/#sle.
 - b. b. CommScope; Uniprise Fiber Panels; SD Series Patch Panels:
www.commscope.com/#sle.
- C. C. Backboards: Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.

1. 1. Size: As indicated on drawings.
 2. 2. Do not paint over UL label.
- D. D. Equipment Frames, Racks and Cabinets:
1. 1. Manufacturers:
 - a. a. CommScope: www.commscope.com/#sle.
 - b. b. Siemon Company: www.siemon.com/#sle.
 - c. c. Substitutions: See Section 016000 - Product Requirements.
 2. 2. Component Racks: [EIA/ECA-310](#) standard 19 inch wide.
 3. 3. Wall Mounted Racks: Steel construction, hinged to allow access to back of installed components.
 4. 4. Floor Mounted Racks: Aluminum or steel construction with corrosion resistant finish; vertical and horizontal cable management channels, top and bottom cable troughs, and grounding lug.
 5. 5. Freestanding Cabinets: Front and rear doors with locks; removable side panels with locks; vented top and rear door; adjustable leveling feet; cable access in roof and base; grounding bar.
 - a. a. Roof mounted fan, capacity .
 6. 6. Wall Mounted Cabinets: Front doors with locks, louvered side panels, top and bottom cable access, and ground lug.
 - a. a. Cover inside of cabinet back with plywood backboard as specified.
 - b. b. Roof mounted fan, capacity .
 - c. c. Duplex AC power outlet inside cabinet.
 7. 7. Cabinets: Steel construction with corrosion resistant finish.
 8. 8. Locks: Keyed alike.
 9. 9. Product(s):
 - a. a. CommScope Two-Post Equipment Racks (Relay Racks) ; www.commscope.com/#sle.
- E. E. Cable Management:
1. 1. Manufacturers:
 - a. a. CommScope: www.commscope.com/#sle.
 - b. b. Siemon Company: www.siemon.com/#sle.
 - c. c. Substitutions: See Section 016000 - Product Requirements.
 2. 2. Product(s):
 - a. a. CommScope Cable Runway: www.commscope.com/#sle.
 - b. b. CommScope Horizontal/Vertical Cable Managers; HCM-SS-XX-XX/VCM-DS-XX-XX Series: www.commscope.com/#sle.
 - c. c. CommScope Fiber Guide Raceway: www.commscope.com/#sle.

2.06 2.06 COMMUNICATIONS OUTLETS

- A. A. Manufacturers:
1. 1. CommScope: www.commscope.com/#sle.
 2. 2. Siemon Company: www.siemon.com/#sle.
 3. 3. Substitutions: See Section 016000 - Product Requirements.
- B. B. Outlet Boxes: Comply with Section 260533.16.
1. 1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
 2. 2. Minimum Size, Unless Otherwise Indicated:
 - a. a. Voice Only Outlets: 4 inch by 2 inch by 2-1/8 inch deep (100 by 50 by 2.13 inch trade size).
 - b. b. Data or Combination Voice/Data Outlets: 4 inch square by 2-1/8 inch deep (100 by 2.13 inch trade size).
 - c. c. Fiber Optic Outlets: 4-11/16 inch square by 2-1/8 inch deep (119 by 2.13 inch trade size).

- C. C. Wall Plates:
 1. 1. Comply with system design standards and [UL 514C](#).
 2. 2. Accepts modular jacks/inserts.
 3. 3. Wall Plate Material/Finish - Flush-Mounted Outlets: High impact thermoplastic, color to be selected by owner.
 4. 4. Product(s):
 - a. a. CommScope Faceplates; M Series: www.commscope.com/#sle.

2.07 2.07 COMMUNICATIONS TRAVELER CABLES FOR ELEVATORS

- A. A. 6 Shielded Pairs, 20 AWG, 2 Coax / RG6 / U, 4.0mm, Super-Flex Traveling Cable (Draka Model 18-214-13 CSX 14 or approved equal).
- B. B. Hanging Device, Steel Core Hanging Device (Draka 5/32-1SBKT-R or approved equal).
- C. C. 1.00 to 1.24 Cable Diameter Range, Single Eye, Single Weave, Closed Mesh, Mesh Grip (Draka 022-01-017 or approved equal).

2.08 2.08 GROUNDING AND BONDING COMPONENTS

- A. A. Comply with [TIA-607](#).
- B. B. Comply with Section 260526.

2.09 2.09 IDENTIFICATION PRODUCTS

- A. A. Comply with [TIA-606](#).
- B. B. Comply with Section 260553.

2.10 2.10 SOURCE QUALITY CONTROL

- A. A. See Section 014000 - Quality Requirements, for additional requirements.
- B. B. Factory test cables according to [TIA-568 \(SET\)](#).

PART 3 EXECUTION

3.01 3.01 INSTALLATION - GENERAL

- A. A. Comply with latest editions and addenda of TIA-568 (SET)(cabling), [TIA-569](#) (pathways), [TIA-607](#) (grounding and bonding), NECA/BICSI 568, [NFPA 70](#), and SYSTEM DESIGN as specified in PART 2.
- B. B. Comply with latest editions and addenda of [TIA-570](#), [TIA-607](#), [NFPA 70](#), and SYSTEM DESIGN as specified in PART 2.
- C. C. Comply with Communication Service Provider requirements.
- D. D. Grounding and Bonding: Perform in accordance with [TIA-607](#) and NFPA 70E. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

3.02 3.02 INSTALLATION OF PATHWAYS

- A. A. Install pathways with the following minimum clearances:
 1. 1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
 2. 2. 12 inches from power conduits and cables and panelboards.
 3. 3. 5 inches from fluorescent and high frequency lighting fixtures.
 4. 4. 6 inches from flues, hot water pipes, and steam pipes.
- B. B. Conduit, in Addition to Requirements of Section 260533.13:
 1. 1. Arrange conduit to provide no more than the equivalent of two 90 degree bend(s) between pull points.
 2. 2. Conduit Bends: Inside radius not less than 10 times conduit internal diameter.
 3. 3. Arrange conduit to provide no more than 100 feet between pull points.
 4. 4. Do not use conduit bodies.

5. 5. Minimum Cover - Underground Service Entrance: Comply with NFPA 70 and Communications Service Provider requirements.
- C. C. Outlet Boxes:
1. 1. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of telecommunications outlets provided under this section.
 - a. a. Mounting Heights: Unless otherwise indicated, as follows:
 - 1) 1) Telephone and Data Outlets: 18 inches above finished floor.
 - 2) 2) Telephone Outlets for Side-Reach Wall-Mounted Telephones: 54 inches above finished floor to top of telephone.
 - 3) 3) Telephone Outlets for Forward-Reach Wall-Mounted Telephones: 48 inches above finished floor to top of telephone.
 - b. b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - c. c. Provide minimum of 24 inches horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
 - d. d. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
 - e. e. Locate outlet boxes so that wall plate does not span different building finishes.
 - f. f. Locate outlet boxes so that wall plate does not cross masonry joints.

3.03 3.03 INSTALLATION OF EQUIPMENT AND CABLING

- A. A. Cabling:
1. 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
 2. 2. Do not over-cinch or crush cables.
 3. 3. Do not exceed manufacturer's recommended cable pull tension.
 4. 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
- B. B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
1. 1. At Distribution Frames: 120 inches.
 2. 2. At Outlets - Copper: 12 inches.
 3. 3. At Outlets - Optical Fiber: 360 inches.

C. COPPER CABLING:

1. 1. Category 6 and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
 2. 2. For 4-pair cables in conduit, do not exceed 25 pounds (110 N) pull tension.
 3. 3. Use T568B wiring configuration.
- B. D. Fiber Optic Cabling:
1. 1. Prepare for pulling by cutting outer jacket for 10 inches from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.
 2. 2. Support vertical cable at intervals as recommended by manufacturer.
 3. 3. All fiber optic cables shall be run from point to point as a homerun. No mechanical splices or fusion splices shall be permitted.
 4. 4. Unless specifically notes otherwise, all fiber optic cable shall be installed in conduit. Conduit fill ratio shall not exceed 60% for fiber optic cabling.
- C. E. Wall-Mounted Racks and Enclosures:
1. 1. Install to plywood backboards only, unless otherwise indicated.
 2. 2. Mount so height of topmost panel does not exceed 78 inches above floor.
- D. F. Floor-Mounted Racks and Enclosures: Permanently anchor to floor in accordance with manufacturer's recommendations.

- E. G. Floor-Mounted Enclosures: Connect adjacent cabinets together and remove interior side panels.
- F. H. Identification:
 - 1. 1. Use wire and cable markers to identify cables at each end.
 - 2. 2. Use manufacturer-furnished label inserts, identification labels, or engraved wall plate to identify each jack at communications outlets with unique identifier.
 - 3. 3. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.

4.02 3.04 FIELD QUALITY CONTROL

- A. A. See Section 014000 - Quality Requirements, for additional requirements.
- B. B. Comply with inspection and testing requirements of specified installation standards.
- C. C. Visual Inspection:
 - 1. 1. Inspect cable jackets for certification markings.
 - 2. 2. Inspect cable terminations for color coded labels of proper type.
 - 3. 3. Inspect outlet plates and patch panels for complete labels.
 - 4. 4. Inspect patch cords for complete labels.
- D. D. Testing - Copper Cabling and Associated Equipment:
 - 1. 1. Test backbone cables after termination but before cross-connection.
 - 2. 2. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
 - 3. 3. Test operation of shorting bars in connection blocks.
 - 4. 4. Category 6 and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
 - 5. 5. Category 6 and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.
- E. E. Testing - Fiber Optic Cabling:
 - 1. 1. Backbone: Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures; perform verification acceptance tests and factory reel tests. NYCHA office of safety and security (OFSS) representative shall be present to witness all OTDR testing.
 - 2. 2. Single Mode Backbone: Perform tests in accordance with [TIA-526-7](#).
 - 3. 3. Links: Perform optical fiber end-to-end attenuation tests and field reel tests.
- F. F. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

END OF SECTION 27 10 00.02