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**Product Guide Specification**

Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat, SectionFormat,* and *PageFormat,* as described in *The CSI Construction Specifications Practice Guide.*

**This section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all “Specifier Notes” after editing this section.**

Section numbers and titles are from *MasterFormat 2011 Update.*

1. **27 15 00**

**COMMUNICATIONS CABLING – OPTICAL FIBER**

**GENERAL**

* + 1. **SECTION INCLUDES**
       1. Details of Horizontal cabling systems and channel performance requirements.
       2. Detailed component specifications for horizontal cable and connecting hardware from Telecommunications Room (TR) to Telecommunication Outlets (TO).
    2. **RELATED REQUIREMENTS**
       1. Section 27 05 26 – Grounding and Bonding for Communications Systems.
       2. Section 27 05 28 – Pathways for Communications Systems.
       3. Section 27 10 00 – Structured Cabling.
       4. Section 27 11 00 – Communications Equipment Room Fittings.
       5. Section 27 13 00 – Communications Backbone Cabling.
       6. Section 27 16 00 – Communications Connecting Cords, Devices, and Adapters.
    3. **REFERENCE STANDARDS**
       1. ANSI/TIA-492AAAF – Detail Specification for Class 1a Graded-Index Multimode Optical Fibers. Current Edition.
       2. ANSI/TIA-492CAAC – Sectional Specification for Class B Single-mode Fibers. Current Edition.
       3. ANSI/TIA-568.0-E – Generic Communications Cabling for Customer Premises.
       4. ANSI/TIA-568.1-E – Commercial Building Telecommunications Cabling Standard.
       5. ANSI/TIA-568.3-D – Optical Fiber Cabling and Components Standard.
       6. ANSI/TIA-569-E – Commercial Building Standard for Telecommunications Pathways and Spaces.
       7. ANSI/TIA-606-C – Administration Standard for the Commercial Telecommunications Infrastructure.
       8. ANSI/TIA-607-D – Commercial Building Bonding and Grounding (Earthing) Requirements for Telecommunications.
       9. NFPA 70 – National Electrical Code (NEC).
       10. BICSI – TDMM, Building Industries Consulting Services International, Telecommunications Distribution Methods Manual (TDMM).
    4. **PRE-INSTALLATION MEETINGS**
       1. Convene pre-installation meeting 2 weeks before start of installation of communications horizontal cabling.
       2. Require attendance of parties directly affecting work of this section, including Contractor, Architect, installer, and manufacturer’s representative.
       3. Review materials, installation, field quality control, labeling, protection, and coordination with other work.
    5. **SUBMITTALS**
       1. Comply with Section 01 33 00 – Submittal Procedures.
       2. Product Data: Submit manufacturer’s product data sheets, including installation instructions verifying that materials comply with specified requirements and are suitable for intended application.
       3. Installer’s Project References: Submit installer’s list of successfully completed communications horizontal cabling projects, including project name and location, name of architect, and type and quantity of communications horizontal cabling installed.
    6. **QUALITY ASSURANCE**
       1. Manufacturer’s Qualifications: Manufacturer regularly engaged, for past 10 years, in manufacture of communications horizontal cabling of similar type to that specified.
       2. Installer's Qualifications:
          1. Approved Leviton Certified Installer before, during, and through completion of the system installation. Supporting documentation will be required as part of the submittal.
          2. Responsible for workmanship and installation practices in accordance with Leviton Certified Installer Program.
    7. **DELIVERY, STORAGE, AND HANDLING**
       1. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
       2. Storage and Handling Requirements:
          1. Store and handle materials in accordance with manufacturer’s instructions.
          2. Keep materials in manufacturer’s original, unopened containers and packaging until installation.
          3. Store materials in clean, dry area indoors.
          4. Protect materials during storage, handling, and installation to prevent damage.
    8. **WARRANTY**
       1. The horizontal communications cabling system installed shall be eligible for coverage by a Limited Lifetime Warranty to the end user.
          1. Horizontal channels shall be completed with the appropriate Berk-Tek cable and Leviton Network Solutions connectivity products, including Leviton factory manufactured patch cords, for each System listed in Part 2 Systems Descriptions below in order to qualify for the Limited Lifetime Warranty.
          2. Approved products shall be listed on the most recent version of the applicable Leviton Systems Data Sheets.
       2. Certified Installer/Certified Integrator shall provide labor, materials, and documentation in accordance with Leviton Network Solutions requirements necessary to ensure that the Owner will be furnished with a Limited Lifetime Warranty.
       3. The installed structured cabling system shall provide a warranty guaranteeing installed channel performance above the ANSI/TIA 568-E requirements for Cat 5e, Cat 6, and/or Cat 6A cabling systems or ISO 11801-1 requirements for Cass D, Class E, and/or Class Ea.
          1. Standards-compliant channel or permanent link performance tests shall be performed in the field with a Leviton approved certification tester in the permanent link test configuration. See 1.8 A.1 above for channel requirements.
       4. Necessary documentation for warranty registration shall be provided to the manufacturer by the installer (within 10 days) following 100 percent testing of cables.
          1. Submit test results to Leviton Network Solutions, in the certification tester’s original software files.
          2. Installer shall ensure that the warranty registration is properly submitted, with all required documentation within 10 days of project completion.
          3. Certified Contractor/Certified Integrator must adhere to the terms and conditions of the respective manufacturer’s warranty programs.
       5. Installer shall ensure that the Owner receives the manufacturer issued project warranty certificate within 60 calendar days of warranty registration.
  1. **SYSTEMS AND PRODUCTS**
     1. **MANUFACTURERS**
        1. Leviton Network Solutions, 2222 222nd Street SE, Bothell, Washington 98021. Phone 425-486-2222. Fax 425-485-3373. Website [www.leviton.com](http://www.leviton.com).

Berk-Tek a Leviton Company, 132 White Oak Road, New Holland, PA 17557 Phone: 717-354-6200. Fax 717-354-7944. Website [www.leviton.com/ns/berktek](http://www.leviton.com/ns/berktek)

* + 1. **OPTICAL FIBER SYSTEMS DESCRIPTION**
       1. Horizontal optical fiber cabling systems are TIA 568 standards compliant intra-building optical fiber communications cabling channels connecting Telecommunication Rooms (TRs) to Telecommunication Outlets (TOs) located at individual work areas.
       2. Each system consists of a matched set of components installed according to industry guidelines that yield a defined and guaranteed systems performance level.
       3. Each Horizontal optical fiber cabling system includes the following components matched to the desired system performance.
          1. Fiber cable
          2. Fiber connectors and adapters
          3. Fiber enclosures
          4. Fiber patch cords and jumpers
          5. Necessary support systems, such as cable managers and faceplates
       4. Optical Fiber Systems and Performance Categories

Optical Fiber Systems consist of specific components to achieve a certain level of performance. Available systems are shown below with the key components included.

**SPECIFIER NOTES:**

* Click on the system name to jump to the detailed system specification (Place curser over the underlined text, hold down the Ctrl button and Click).
* Delete Section 2.2D and any Optical Fiber Systems not required for completed specification.
* Detailed specifications for components are available in Section 2.4 of this template. Delete any components not required for completed specification.
* See <http://www.leviton.com/ns/berktek> for cable type (tight buffer or loose tube), fiber count, application environment (indoor or indoor/outdoor), armoring options, colors, and part numbers.
  + - * 1. [OM1 Fiber Optic System](#gjdgxs)
        2. [OM3 Fiber Optic System](#30j0zll)
        3. [OM4 Fiber Optic System](#1fob9te)
        4. [OS2 Fiber Optic System](#2et92p0)
      1. Cables: Route through conduit, cable trays, spaces below raised floors, open ceiling areas, non-ventilated spaces above ceiling tile, and through plenum air-handling spaces above ceiling tile.
      2. Furnish and install all materials necessary for a complete and working communications horizontal cabling system.
    1. **OPTICAL FIBER SYSTEMS CHANNEL PERFORMANCE SPECIFICATIONS** 
       1. Optical Fiber Cable. **OM1 Fiber Optic System**:

1. Each Multimode Fiber shall be:
2. Graded-index optical fiber wave-guide with nominal **62.5/125m**-core/cladding diameter.
3. The fiber shall comply with the latest revision of ANSI/TIA-492AAAA-A.
4. Attenuation shall be measured in accordance with ANSI/TIA-455-78.
5. Information transmission capacity shall be measured in accordance with the latest revision of ANSI/TIA-455-204.
6. The measurements shall be performed at 23°C ± 5°C.
7. Maximum attenuation dB/km @ 850/1300 nm: 3.5/1.0
8. OFL Bandwidth 200 MHz-km @ 850nm.
9. OFL Bandwidth 500 MHz-km @ 1300nm.
10. Optical Fiber shall guarantee 1Gigabit Ethernet distances of 300m/600m for 850nm and 1300nm respectively
11. Physical Characteristics:
12. Shall be suitable for use in indoors or in indoor/outdoor applications.
13. Appropriately flame rated optical cable shall be suitable for use in risers, plenums and horizontal applications.
14. Plenum rated optical cables shall have and be marked with an UL or ETL OFNP and OFNP FT6 Flame Rating. Armored plenum rated optical cables shall have and be marked with an UL or ETL OFCP and OFCP FT6 Flame Rating. Riser rated optical cables shall have and be marked with an UL or ETL OFNR and OFNR FT4 Flame Rating. Armored riser rated optical cables shall have and be marked with an UL or ETL OFCR and OFCR FT4 Flame Rating.
15. Shall comply with the requirements of ICEA S-83-596 (Premises), ICEA S-104-696 (I/O), or ANSI/ICEA S-87-640 (Outside Plant, OSP).
16. Indoor/Outdoor cables shall be suitable for underground or aboveground conduits.
17. Optical cables and fibers shall be color coded in accordance with TIA-598-C.
18. Cables may include a ripcord for the overall jacket.

1. Design Make:
2. **Berk-Tek Plenum optical fiber cable with OM1 62.5/125 micron fiber**
   * + LTPxxxCB3510/25, (006 or 012 optical fibers, I/O Loose Tube)
     + LTP12BxxxCB3510/25, (012, 024, 048, 072, 096, 144, 288, or 432 optical fibers, I/O Loose Tube)
     + PDPxxxCB3510/25 (006, 012, or 024 optical fibers, Indoor Tight Buffer)
     + PDP12BxxxCB3510/25, (036, 048, 072, 096, or 144 optical fibers, Indoor Tight Buffer)
     + PDPxxxCB3510/25-I/O-C4(ORA), (006, 012, or 024 optical fibers, Indoor/Outdoor Tight Buffer)
     + PDP12BxxxCB3510/25-I/O-C4(ORA), (036, 048, 072, 096, or 144 optical fibers, Indoor/Outdoor Tight Buffer)
3. **Berk-Tek Riser optical fiber cable with OM1 62.5/125 micron fiber**
   * + LTRxxxCB3510/25, (006 or 012 optical fibers, I/O Loose Tube)
     + LTR12BxxxCB3510/25, (012, 024, 048, 072, 096, 144, 288, or 432 optical fibers, I/O Loose Tube)
     + PDRxxxCB3510/25, (006, 012, or 024 optical fibers, Indoor Tight Buffer)
     + PDR12BxxxCB3510/25, (036, 048, 072, 096, or 144 optical fibers, Indoor Tight Buffer)
     + PDRxxxCB3510/25-I/O(BLA), (006, 012, or 024 optical fibers, Indoor/Outdoor Tight Buffer)
     + PDR12BxxxCB3510/25-I/O(BLA), (036, 048, 072, 096, or 144 optical fibers, Indoor/Outdoor Tight Buffer)
4. **Berk-Tek OSP optical fiber cable with OM1 62.5/125 micron fiber**
   * + OPDxxxCB3510/25, (006 or 012 optical fibers, Loose Tube, gel buffer tube)
     + OPDD12BxxxCB3510/25, (024, 048, 072, 096, 144, 288, or 432 optical fibers, Loose Tube, gel buffer tube)
5. **Berk-Tek Armored optical fiber cables with OM1 62.5/125 micron fiber**
   * + Plenum and Riser with Interlock Armor: LTPK, PDPK, PDPK-I/O, LTRK, PDRK, and PDRK-I/O
     + Riser with corrugated steel armor: LTRA. 12B stranded design fiber counts 012, 024, 048, 072, 096, 144, 288, or 432
     + OSP with corrugated steel armor: OPA and OPAD

* + - 1. Optical Fiber Cable. **OM3 Fiber Optic System**:

1. Each Multimode Fiber shall be:
2. Graded-index optical fiber wave-guide with nominal **50/125m**-core/cladding diameter.
3. The fiber shall comply with the latest revision of ANSI/TIA-492AAAC.
4. Attenuation shall be measured in accordance with ANSI/TIA-455-78.
5. Information transmission capacity shall be measured in accordance with the latest revision of ANSI/TIA-455-204.
6. The measurements shall be performed at 23°C ± 5°C.
7. Maximum attenuation dB/km @ 850/1300 nm: 3.0/1.0
8. EMB Bandwidth 2000 MHz-km @ 850nm.
9. OFL Bandwidth 500 MHz-km @ 1300nm.
10. Optical Fiber shall be Bend-insensitive Laser Optimized and guarantee 1Gigabit Ethernet distances of 1000m/600m for 850nm and 1300nm, respectively.
11. Optical fiber shall guarantee a 10 Gigabit Ethernet distance of 300m at 850nm
12. Physical Characteristics:
13. Shall be suitable for use in indoors or in indoor/outdoor applications.
14. Appropriately flame rated optical cable shall be suitable for use in risers, plenums and horizontal applications.
15. Plenum rated optical cables shall have and be marked with an UL or ETL OFNP and OFNP FT6 Flame Rating. Armored plenum rated optical cables shall have and be marked with an UL or ETL OFCP and OFCP FT6 Flame Rating. Riser rated optical cables shall have and be marked with an UL or ETL OFNR and OFNR FT4 Flame Rating. Armored riser rated optical cables shall have and be marked with an UL or ETL OFCR and OFCR FT4 Flame Rating.
16. Shall comply with the requirements of ICEA S-83-596 (Premises), ICEA S-104-696 (I/O), or ANSI/ICEA S-87-640 (Outside Plant, OSP).
17. Indoor/Outdoor cables shall be suitable for underground or aboveground conduits.
18. Optical cables and fibers shall be color coded in accordance with TIA-598-C.
19. Cables may include a ripcord for the overall jacket.

1. Design Make:
2. **Berk-Tek Plenum optical fiber cable with OM3 Bend-insensitive Laser Optimized 50/125 micron fiber**
   * + LTPxxxEB3010/25, (006 or 012 Bend-insensitive Laser Optimized optical fibers, I/O Loose Tube)
     + LTP12BxxxEB3010/25, (012, 024, 048, 072, 096, 144, 288, or 432 Bend-insensitive Laser Optimized optical fibers, I/O Loose Tube)
     + PDPxxxEB3010/25, (006, 012, or 024 Bend-insensitive Laser Optimized optical fibers, Indoor Tight Buffer)
     + PDP12BxxxEB3010/25, (036, 048, 072, 096, or 144 Bend-insensitive Laser Optimized optical fibers, Indoor Tight Buffer)
     + PDPxxxEB3010/25-I/O-C4(AQU), (006, 012, or 024 optical fibers, Indoor/Outdoor Tight Buffer)
     + PDP12BxxxEB3010/25-I/O-C4(AQU), (036, 048, 072, 096, or 144 optical fibers, Indoor/Outdoor Tight Buffer)
3. **Berk-Tek Riser optical fiber cable with OM3 Bend-insensitive Laser Optimized 50/125 micron fiber**
   * + LTRxxxEB3010/25, (006 or 012 Bend-insensitive Laser Optimized optical fibers, I/O Loose Tube)
     + LTR12BxxxEB3010/25, (012, 024, 048, 072, 096, 144, 288, or 432 Bend-insensitive Laser Optimized optical fibers, I/O Loose Tube)
     + PDRxxxEB3010/25, (006, 012, or 024 Bend-insensitive Laser Optimized optical fibers, Indoor Tight Buffer)
     + PDR12BxxxEB3010/25, (036, 048, 072, 096, or 144 Bend-insensitive Laser Optimized optical fibers, Indoor Tight Buffer)
     + PDRxxxEB3010/25-I/O(BLA), (006, 012, or 024 optical fibers, Indoor/Outdoor Tight Buffer)
     + PDR12BxxxEB3010/25-I/O(BLA), (036, 048, 072, 096, or 144 optical fibers, Indoor/Outdoor Tight Buffer)
4. **Berk-Tek OSP optical fiber cable with OM3 Bend-insensitive Laser Optimized 50/125 micron fiber**
   * + OPDxxxEB3010/25, (006 or 012 Bend-insensitive Laser Optimized optical fibers, Loose Tube, gel buffer tube)
     + OPDD12BxxxEB3010/25, (024, 048, 072, 096, 144, 288, or 432 Bend-insensitive Laser Optimized optical fibers, Loose Tube, gel buffer tube)
5. **Berk-Tek Armored optical fiber cables with OM3 Bend-insensitive Laser Optimized 50/125 micron fiber**
   * + Plenum and Riser with Interlock Armor: LTPK, PDPK, PDPK-I/O, LTRK, PDRK, and PDRK-I/O
     + Riser with corrugated steel armor: LTRA. 12B stranded design fiber counts 012, 024, 048, 072, 096, 144, 288, or 432
     + OSP with corrugated steel armor: OPA and OPAD

* + - 1. Optical Fiber Cable. **OM4 Fiber Optic System**:

1. Each Multimode Fiber shall be:
2. Graded-index optical fiber wave-guide with nominal **50/125m**-core/cladding diameter.
3. The fiber shall comply with the latest revision of ANSI/TIA-492AAAD.
4. Attenuation shall be measured in accordance with ANSI/TIA-455-78.
5. Information transmission capacity shall be measured in accordance with the latest revision of ANSI/TIA-455-204.
6. The measurements shall be performed at 23°C ± 5°C.
7. Maximum attenuation dB/km @ 850/1300 nm: 3.0/1.0
8. EMB Bandwidth 4700 MHz-km @ 850nm.
9. OFL Bandwidth 500 MHz-km @ 1300nm.
10. Optical Fiber shall be Bend-insensitive Laser Optimized and guarantee 1Gigabit Ethernet distances of 1040m/600m for 850nm and 1300nm, respectively.
11. Optical fiber shall guarantee a 10 Gigabit Ethernet distance of 550m at 850nm
12. Physical Characteristics:
13. Shall be suitable for use in indoors or in indoor/outdoor applications.
14. Appropriately flame rated optical cable shall be suitable for use in risers, plenums and horizontal applications.
15. Plenum rated optical cables shall have and be marked with an UL or ETL OFNP and OFNP FT6 Flame Rating. Armored plenum rated optical cables shall have and be marked with an UL or ETL OFCP and OFCP FT6 Flame Rating. Riser rated optical cables shall have and be marked with an UL or ETL OFNR and OFNR FT4 Flame Rating. Armored riser rated optical cables shall have and be marked with an UL or ETL OFCR and OFCR FT4 Flame Rating.
16. Shall comply with the requirements of ICEA S-83-596 (Premises), ICEA S-104-696 (I/O), or ANSI/ICEA S-87-640 (Outside Plant, OSP).
17. Indoor/Outdoor cables shall be suitable for underground or aboveground conduits.
18. Optical cables and fibers shall be color coded in accordance with TIA-598-C.
19. Cables may include ripcord for the overall jacket.

1. Design Make:
2. **Berk-Tek Plenum optical fiber cable with OM4 Bend-insensitive Laser Optimized 50/125 micron fiber**
   * + LTPxxxFB3010/F5, (006 or 012 Bend-insensitive Laser Optimized optical fibers, I/O Loose Tube)
     + LTP12BxxxFB3010/F5, (012, 024, 048, 072, 096, 144, 288, or 432 Bend-insensitive Laser Optimized optical fibers, I/O Loose Tube)
     + PDPxxxFB3010/F5 (006, 012, or 024 Bend-insensitive Laser Optimized optical fibers, Indoor Tight Buffer)
     + PDP12BxxxFB3010/F5, (036, 048, 072, 096, or 144 Bend-insensitive Laser Optimized optical fibers, Indoor Tight Buffer)
     + PDPxxxFB3010/F5-I/O-C4(AQU), (006, 012, or 024 optical fibers, Indoor/Outdoor Tight Buffer)
     + PDP12BxxxFB3010/F5-I/O-C4(AQU), (036, 048, 072, 096, or 144 optical fibers, Indoor/Outdoor Tight Buffer)
3. **Berk-Tek Riser optical fiber cable with OM4 Bend-insensitive Laser Optimized 50/125 micron fiber**
   * + LTRxxxFB3010/F5, (006 or 012 Bend-insensitive Laser Optimized optical fibers, I/O Loose Tube)
     + LTR12BxxxFB3010/F5, (012, 024, 048, 072, 096, 144, 288, or 432 Bend-insensitive Laser Optimized optical fibers, I/O Loose Tube)
     + PDRxxxFB3010/F5, (006, 012, or 024 Bend-insensitive Laser Optimized optical fibers, Indoor Tight Buffer)
     + PDR12BxxxFB3010/F5, (036, 048, 072, 096, or 144 Bend-insensitive Laser Optimized optical fibers, Indoor Tight Buffer)
     + PDRxxxFB3010/F5-I/O(BLA), (006, 012, or 024 optical fibers, Indoor/Outdoor Tight Buffer)
     + PDR12BxxxFB3010/F5-I/O(BLA), (036, 048, 072, 096, or 144 optical fibers, Indoor/Outdoor Tight Buffer)
4. **Berk-Tek OSP optical fiber cable with OM4 Bend-insensitive Laser Optimized 50/125 micron fiber**
   * + OPDxxxFB3010/F5, (006 or 012 Bend-insensitive Laser Optimized optical fibers, Loose Tube, gel buffer tube)
     + OPDD12BxxxFB3010/F5, (024, 048, 072, 096, 144, 288, or 432 Bend-insensitive Laser Optimized optical fibers, Loose Tube, gel buffer tube)
5. **Berk-Tek Armored optical fiber cables with OM4 Bend-insensitive Laser Optimized 50/125 micron fiber**
   * + Plenum and Riser with Interlock Armor: LTPK, PDPK, PDPK-I/O, LTRK, PDRK, and PDRK-I/O
     + Riser with corrugated steel armor: LTRA. 12B stranded design fiber counts 012, 024, 048, 072, 096, 144, 288, or 432
     + OSP with corrugated steel armor: OPA and OPAD

* + - 1. Single-Mode Optical Fiber Cable. **OS2 Fiber Optic System**:

1. Each Single-mode Fiber shall be:
   1. Dispersion - unshifted single mode optical fibers with Low Water Peak complying with ITU-T G.652.D and with improved bending loss complying with ITU-T G.657.A1.
   2. The zero dispersion wavelength shall be between 1300 nm and 1324 nm. The ANSI/TIA-455-168 maximum value of the dispersion slope shall be no greater than 0.092 ps/km-nm2. Dispersion measurements shall be made in accordance with ANSI/TIA-455-169 or ANSI/TIA-455-175-B.
   3. The nominal mode field diameter shall be 9.2 m with a tolerance of + 0.4 m -0.7 m at 1310 nm when measured in accordance with ANSI/TIA-455-191-B.
   4. Transmission Characteristics:
   5. Maximum cabled attenuation for loose tube fibers shall be 0.4/0.3 dB/km @ 1310/1550 nm.
   6. Maximum cabled attenuation for tight buffer fibers shall be 0.7/0.7 dB/km @ 1310/1550 nm.
   7. The cabled cutoff wavelength shall be ≤1260 nm when measured in accordance with ANSI/TIA-455-80-C.
2. Physical Characteristics:
3. Shall be suitable for use in indoors or in indoor/outdoor applications.
4. Appropriately flame rated optical cable shall be suitable for use in risers, plenums and horizontal applications.
5. Plenum rated optical cables shall have and be marked with an UL or ETL OFNP and OFNP FT6 Flame Rating. Armored plenum rated optical cables shall have and be marked with an UL or ETL OFCP and OFCP FT6 Flame Rating. Riser rated optical cables shall have and be marked with an UL or ETL OFNR and OFNR FT4 Flame Rating. Armored riser rated optical cables shall have and be marked with an UL or ETL OFCR and OFCR FT4 Flame Rating.
6. Shall comply with the requirements of ICEA S-83-596 (Premises), ICEA S-104-696 (I/O), or ANSI/ICEA S-87-640 (Outside Plant, OSP).
7. Indoor/Outdoor cables shall be suitable for underground or aboveground conduits.
8. Optical cables and fibers shall be color coded in accordance with TIA-598-C.
9. Cables may include a ripcord for the overall jacket.

1. Design Make:
2. **Berk-Tek Plenum optical fiber cable with OS2 (Low Water Peak) Bend-insensitive Single-mode fiber**
   * + LTPxxxAB0403, (006 or 012 Bend-insensitive optical fibers, I/O Loose Tube)
     + LTP12BxxxAB0403, (012, 024, 048, 072, 096, 144, 288, or 432 Bend-insensitive optical fibers, I/O Loose Tube)
     + PDPxxxAB0707, (006, 012, or 024 Bend-insensitive optical fibers, Indoor Tight Buffer)
     + PDP12BxxxAB0707, (036, 048, 072, 096, or 144 Bend-insensitive optical fibers, Indoor Tight Buffer)
     + PDPxxxAB0707-I/O-C4(YEL), (006, 012, or 024 optical fibers, Indoor/Outdoor Tight Buffer)
     + PDP12BxxxAB0707-I/O-C4(YEL), (036, 048, 072, 096, or 144 optical fibers, Indoor/Outdoor Tight Buffer)
3. **Berk-Tek Riser optical fiber cable with OS2 (Low Water Peak) Bend-insensitive Single-mode fiber**
   * + LTRxxxAB0403, (006 or 012 Bend-insensitive optical fibers, I/O Loose Tube)
     + LTR12BxxxAB0403, (012, 024, 048, 072, 096, 144, 288, or 432 Bend-insensitive optical fibers, I/O Loose Tube)
     + PDRxxxAB0707, (006, 012, or 024 Bend-insensitive optical fibers, Indoor Tight Buffer)
     + PDR12BxxxAB0707, (036, 048, 072, 096, or 144 Bend-insensitive optical fibers, Indoor Tight Buffer)
     + PDRxxxAB0707-I/O(BLA), (006, 012, or 024 optical fibers, Indoor/Outdoor Tight Buffer)
     + PDR12BxxxAB0707-I/O(BLA), (036, 048, 072, 096, or 144 optical fibers, Indoor/Outdoor Tight Buffer)
4. **Berk-Tek OSP optical fiber cable with OS2 (Low Water Peak) Bend-insensitive Single-mode fiber**
   * + OPDxxxAB0403, (006 or 012 Bend-insensitive optical fibers, Loose Tube, gel buffer tube)
     + OPDD12BxxxAB0403, (024, 048, 072, 096, 144, 288, or 432 Bend-insensitive optical fibers, Loose Tube, gel buffer tube)
5. **Berk-Tek Armored optical fiber cables with OS2 (Low Water Peak) Bend-insensitive Single-mode fiber**
   * + Plenum and Riser with Interlock Armor: LTPK, PDPK, PDPK-I/O, LTRK, PDRK, and PDRK-I/O
     + Riser with corrugated steel armor: LTRA. 12B stranded design fiber counts 012, 024, 048, 072, 096, 144, 288, or 432
     + OSP with corrugated steel armor: OPA and OPAD
     1. **DETAILED COMPONENT SPECIFICATIONS**
        1. FIBER ADAPTERS FOR WORKSTATION OUTLETS
        2. Multimode Fiber Modular Adapters for workstation outlets:
           1. QuickPort Duplex LC Adapter, beige adapter for OM1 multimode fiber, phosphor-bronze sleeve. Use for **OM1 Fiber Optic System**.

Color of plastic housing: white

Part Number: Leviton 41085-MLW (white).

* + - * 1. QuickPort Duplex LC Adapter, aqua adapter for OM3/OM4 Bend-insensitive Laser Optimized multimode fiber, zirconia ceramic sleeve. Use for **OM3 Fiber Optic System**, **OM4 Fiber Optic System**, or **OM4+ Fiber Optic System**

Color of plastic housing: white

Part Number: Leviton 41085-LLW (white).

* + - * 1. QuickPort Simplex SC Adapter for multimode fiber, phosphor-bronze sleeve.

Color of plastic housing: white

Part Number: Leviton 41085-MWC (white).

* + - 1. Single Mode Fiber Modular Adapters for workstation outlets: Use for **OS2 Fiber Optic System**.
         1. QuickPort Duplex LC Adapter, blue adapter for OS1/OS2 Single Mode fiber, zirconia ceramic sleeve.

Color of plastic housing: white

Part Number: Leviton 41085-SLW (white).

* + - * 1. QuickPort Simplex SC Adapter, for OS1/OS2 Single Mode fiber, zirconia ceramic sleeve.

Color of plastic housing: white

Part Number: Leviton 41085-SWC (white).

* + - 1. WORK AREA HOUSINGS
         1. Flush-mounted Plastic Wallplates w/ designation window

The wallplate housing shall be a one-piece, single- or dual-gang flush mount style that fits standard NEMA openings.

Wallplate shall provide 1, 2, 3, 4, 6, 8 or 12 ports.

Wallplate shall be able to accept connector modules from approved connector module manufacturer.

Wallplate shall be made of high-impact, fire-retardant plastic rated UL 94V-0, and be cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet ANSI/TIA-568 specifications.

Colors, port counts and configurations to be specified per schedule on plan.

The flush-mounted wallplate shall have no visible mounting screws after installation.

The flush-mounted wallplate shall have the option of being mounted on adapter boxes for surface mount installation.

The flush-mounted wallplate shall have a labeling capability using built-in labeling windows, to facilitate outlet identification and ease network management.

The flush-mounted wallplate shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network needs such as audio, video, coaxial and optical fiber applications.

Part Numbers: 42080-x\*S Single gang

42080-y\*P Dual gang

42080-12\* Dual gang 12 port

x = single gang port count (1, 2, 3, 4, 6)

y = dual gang port count (1, 2, 3, 4, 6, 8)

\* = color option: 6 colors available (white, light almond, ivory, grey, black)

Wallplate Colors: Standard color is white. Coordinate with Architect to match finish.

* + - * 1. Flush-mounted Plastic Wallplates

The wallplate housing shall be a one-piece, single -gang flush mount style that fits standard NEMA openings.

Wallplate shall provide 1, 2, 3, 4, or 6 ports.

Wallplate shall be able to accept connector modules from approved connector module manufacturer.

Wallplate shall be made of high-impact, fire-retardant plastic rated UL 94V-0, and be cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet ANSI/TIA-568 specifications.

Colors, port counts and configurations to be specified per schedule on plan.

Wallplate screws must match wallplate color.

The flush-mounted wallplate shall have the option of being mounted on adapter boxes for surface mount installation.

The flush-mounted wallplate shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network needs such as audio, video, coaxial and optical fiber applications.

Part Numbers: 41080-x\*S Single gang

x = single gang port count (1, 2, 3, 4, 6)

\* = color option: 6 colors available (white, light almond, ivory, grey, black)

Wallplate Colors: Standard color is white. Coordinate with Architect to match finish.

* + - * 1. Flush-Mounted Stainless Steel Wallplates with designation window

The wallplate housing shall be a single- or dual-gang flush mount style that fits standard NEMA openings.

Wallplate shall provide 1, 2, 3, 4, 6, 8 or 12 ports.

Wallplate must be able to accept connector modules from approved connector module manufacturer.

Wallplate must be manufactured from 304 stainless steel in a brushed finish to provide corrosion resistance in a non-magnetic material and be cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet ANSI/TIA-568 specifications.

Port counts and configurations to be specified per schedule on plan.

Wallplate screws must match wallplate color.

The flush-mounted wallplate shall have no visible mounting screws after installation.

The flush-mounted wallplate shall have the option of being mounted on adapter boxes for surface mount installation.

The flush-mounted wallplate shall have a labeling capability using built-in labeling windows, to facilitate outlet identification and ease network management.

The flush-mounted wallplate shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network needs such as audio, video, coaxial and optical fiber applications.

Part Numbers: 43080-1Lx Single gang

43080-2Ly Dual gang

x = single gang port count (1, 2, 3, 4, 6)

y = dual gang port count (4, 8)

* + - * 1. Flush-Mounted Stainless Steel Wallplates

The wallplate housing shall be a single- or dual-gang flush mount style that fits standard NEMA openings.

Wallplate shall provide 1, 2, 3, 4, 6, 8 or 12 ports.

Wallplate must be able to accept connector modules from approved connector module manufacturer.

Wallplate must be manufactured from 304 stainless steel in a brushed finish to provide corrosion resistance in a non-magnetic material and be cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet ANSI/TIA-568 specifications.

Port counts and configurations to be specified per schedule on plan.

Wallplate screws must match wallplate color.

The flush-mounted wallplate shall have the option of being mounted on adapter boxes for surface mount installation.

The flush-mounted wallplate shall have a labeling capability using built-in labeling windows, to facilitate outlet identification and ease network management.

The flush-mounted wallplate shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network needs such as audio, video, coaxial and optical fiber applications.

Part Numbers: 43080-1Sx Single gang

43080-2Sy Dual gang

43080-S12 Dual gang 12-port

x = single gang port count (1, 2, 3, 4, 6)

y = dual gang port count (2, 4, 6, 8)

* + - * 1. Flush-Mounted Stainless Steel Phone Wallplates

The wallplate housing shall be a single-gang flush mount style that fits standard NEMA openings.

Wallplate shall provide 1 port.

Wallplate shall be able to accept connector modules from approved connector module manufacturer.

Wallplate shall be manufactured from 304 stainless steel in a brushed finish to provide corrosion resistance in a non-magnetic material and be cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet ANSI/TIA-568 specifications.

Part Numbers: 4108W-0SP (flush connector)

4108W-1SP (recessed connector)

* + - * 1. Surface-Mounted Outlet Boxes

The surface mount housing shall provide 1, 2, 4, 6, or 12 ports.

The surface mount housing base and cover shall include knockouts for rear, bottom, or side cable entry.

The surface mount housing base shall include cable anchor points.

The surface mount housing mounting methods shall include screws, pressure sensitive adhesive, and magnets.

The surface mount housing cover shall have a labeling capability using built-in labeling windows, to facilitate outlet identification and ease network management.

The surface mount housing cover shall accommodate a user provided #6 x 1/2" security screw.

The surface mount housing shall have no visible mounting screws after installation.

The surface mount housing shall be made of high-impact, fire-retardant plastic rated UL 94V-0, and be cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet ANSI/TIA-568 specifications.

2-port housings shall comply with UL 2043 as suitable for use in air-handling spaces per NEC 300-22(b)(c).

The surface mount housing shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network needs such as audio, video, coaxial and optical fiber applications.

Part Numbers: 41089-x\*P

41089-12\*

4S089-y^P

x = port count (1, 2, 4, 6)

\* = color option: 5 colors available (white, ivory, grey, black)

y = extended depth port count (2, 4)

^ = color option: 2 colors available (white, ivory)

Surface mount box Colors: Standard color is white. Coordinate with Architect to match finish.

* + - * 1. Modular Furniture Plates

The modular furniture plate shall be a field-configurable faceplate providing from one to four flush-mount ports for a variety of snap-in connectors and adapters.

The modular furniture plate shall extend 0.75" from the furniture raceway to facilitate fiber or copper cable bend-radius compliance, or to compensate for shallow or crowded raceway channels.

The modular furniture plate shall have a rattle-free fit and a tool-less release latch.

The modular furniture plate shall be made of high-impact, fire-retardant plastic rated UL 94V-0, and be cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet ANSI/TIA-568 specifications.; be constructed of high-impact self-extinguishing plastic rated UL 94V-O; and be cULus Listed, and compliant with FCC Part 68, NEC Article 800 and ANSI/TIA-568-D specifications.

The modular furniture plate shall have a labeling capability using built-in labeling windows, to facilitate outlet identification and ease network management.

The modular furniture plate shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network needs such as audio, video, coaxial and optical fiber applications.

Part Numbers: 49910-S\*x (standard)

49910-H\*x (Herman Miller)

49910-E\*4 (extended depth)

x = port count (2, 4)

\* = color option: 4 colors available (white, ivory, grey, black)

Furniture plate Colors: Standard color is white. Coordinate with Architect to match finish.

* + - * 1. Multimedia Outlet System – Flush-Mounted Wallplates, Surface Mount Housings and Outlet Adapter Modules

The wallplate housing shall be a single- or dual-gang flush mount style that fits standard NEMA openings.

Plastic wallplate and housings shall be made of high-impact, fire-retardant plastic rated UL 94V-0, and be cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet ANSI/TIA-568 specifications.

Metallic wallplates shall be manufactured from 304 stainless steel in a brushed finish to provide corrosion resistance in a non-magnetic material, and be UL Listed, cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet ANSI/TIA-568 specifications.

The wallplate or housing shall be front-loading, configurable with individual ports.

The wallplate or housing shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network needs such as audio, video, coaxial and optical fiber applications.

The surface mount housing cover shall have a labeling capability using built-in labeling windows, to facilitate outlet identification and ease network management.

The surface mount housing cover shall accommodate a user provided #6 x 1/2" security screw.

A fiber storage/spacer ring shall be available as an accessory. The ring shall mount behind a front-loading double-gang wallplate or on top of dual-gang NEMA-style surface-mount box to provide 0.6-inch extra depth and a guided cable path in support of ANSI/TIA-568-D bend radius requirements.

Part Numbers: 41290-SM\* Single gang flush-mounted

41290-DM\* Dual gang flush-mounted

41290-DR^ Fiber storage/spacer ring

4M089-1^M Surface mount housing, 1-module

41296-MM^ Surface mount housing, 3 modules

\* = color option: 6 colors available (white, light almond, ivory, grey, black, stainless steel)

^ = color option: 5 colors available (white, light almond, ivory, grey, black)

Wallplate Colors: Standard color is white. Coordinate with Architect to match finish.

Multimedia Outlet System (MOS) Inserts: For a complete list of MOS Inserts available please visit [www.leviton.com/mos](http://www.leviton.com/mos)

* + 1. **FIBER OPTIC TERMINATION ENCLOSURES and SPLICE TRAYS.** Use for **OM1 Fiber Optic System**, **OM3 Fiber Optic System**, **OM4 Fiber Optic System**, **OM4+ Fiber Optic System**,and **OS2 Fiber Optic System**
       1. Opt-X UHDX Fiber Optic Enclosures: High-end appearance, metal and composite, rack mountable, holds various HDX fiber adapter plates or MTP cassettes, based on connector choice and density requirements.
          1. 1RU Opt-X UHD rack-mount Fiber Optic Enclosure, empty, with sliding trays.

Capacity: 144 fiber strands (LC), 12 MTP cassettes or 12 fiber adapter plates

Part Number:  Leviton 5R1UD-S12.

* + - * 1. 2RU Opt-X UHD rack-mount Fiber Optic Enclosure, empty, with sliding trays.

Capacity: 288 fiber strands (LC), 24 MTP cassettes or 24 fiber adapter plates

Part Number:  Leviton 5R2UD-S24.

* + - * 1. 4RU Opt-X UHD rack-mount Fiber Optic Enclosure, empty, with sliding trays.

Capacity: 576 fiber strands (LC), 48 MTP cassettes or 48 fiber adapter plates

Part Number:  Leviton 5R4UD-S48

* + - 1. Opt-X UHDX Fiber Optic Panels: Open architecture, metal, rack mountable, holds various HDX fiber adapter plates or MTP cassettes, based on connector choice and density requirements.
         1. 1RU Opt-X HDX 1RU rack-mount Fiber Optic Panel, Flat, empty.

Capacity: 144 fiber strands (LC), HDX 12 MTP cassettes, splice modules or fiber adapter plates

Part Number:  Leviton HDX1F-144.

* + - * 1. 1RU Opt-X HDX 1RU rack-mount Fiber Optic Panel, Angled, empty.

Capacity: 144 fiber strands (LC), HDX 12 MTP cassettes, splice modules or fiber adapter plates

Part Number:  Leviton HDX1A-144.

* + - * 1. Rear Cable Manager.

Mounts directly to all HDX panels

Part Number:  Leviton E2XHD-CMB.

* + - * 1. Front Cable Manager.

Mounts directly over all HDX panels.

1RU and 2RU options.

Removable door and horizontal cable management fingers

Part Numbers:  1RU - Leviton 5R1UX-CMT, 2RU 5R2UX-CMT.

* + - 1. Splice Modules: HDX splice modules with pre-ribbonized, color coded pigtails allowing ribbon or single fiber splicing without any additional preparatory steps. Compatible with all HDX Frames, enclosures, patch panels and adapter brackets
         1. Use for **OM3 Fiber Optic System,** **OM4 Fiber Optic System,** or **OM4+ Fiber Optic Systems with HDX enclosures or panels**

HDX 12-Fiber LC OM4 Splice Module, Shuttered LC, aqua

Part Number: Leviton SPLCH-12AQ

HDX 12-Fiber LC OM4 Splice Module, Non-Shuttered, LC aqua

Part Number: Leviton SPLCH-12A

HDX 12-Fiber LC OM4 Splice Module, Shuttered LC, heather violet

Part Number: Leviton SPLCH-1HV

HDX 12-Fiber LC OM4 Splice Module, Non-Shuttered LC, heather violet

Part Number: Leviton SPLCH-12M

HDX 36-Fiber MTP OM4 Splice Module, 3 port x 12F male

Part Number: Leviton SPMPH-MMPN

HDX 36-Fiber MTP OM4 Splice Module, 3 port x 12F female

Part Number: Leviton SPMPH-MMUP

* + - * 1. Use for **OS2 Fiber Optic System**

HDX 12-Fiber LC OS2 Splice Module, Shuttered LC, blue

Part Number: Leviton SPLCH-12BL

HDX 12-Fiber LC OS2 Splice Module, Non-Shuttered LC, blue

Part Number: Leviton SPLCH-12L

HDX 12-Fiber LC OS2 Splice Module, Shuttered LC/APC, green

Part Number: Leviton SPLCH-12GN

HDX 12-Fiber LC OS2 Splice Module, Non-Shuttered LC/APC, green

Part Number: Leviton SPLCH-12V

HDX 36-Fiber MTP OS2 Splice Module, 3 port x 12F male

Part Number: Leviton SPMPH-SMPN

HDX 36-Fiber MTP OS2 Splice Module, 3 port x 12F female

Part Number: Leviton SPMPH-SMUP

* + - 1. Opt-X 2000i SDX Fiber Optic Enclosures: High-end appearance, metal and composite, rack mountable, holds various fiber adapter plates, splice trays, or MTP modules, based on connector choice and density requirements.
         1. 1RU Opt-X 2000i SDX rack-mount Fiber Optic Enclosure, empty, with sliding tray.

Capacity: 72 fiber strands (LC), 3 fiber adapter plates and 3 splice trays, or 3 MTP modules

Part Number: Leviton 5R1UH-S03.

* + - * 1. 2RU Opt-X 2000i SDX rack-mount Fiber Optic Enclosure, empty, with sliding tray.

Capacity: 144 fiber strands (LC), 6 fiber adapter plates and 6 splice trays, or 6 MTP modules

Part Number: Leviton 5R2UH-S06.

* + - * 1. 4RU Opt-X 2000i SDX rack-mount Fiber Optic Enclosure, empty, with sliding tray.

Capacity: 288 fiber strands (LC),12 fiber adapter plates and 12 splice trays, or 12 MTP modules

Part Number: Leviton 5R4UH-S12.

* + - 1. Opt-X 1000i SDX Fiber Optic Enclosures: High-end features, all metal enclosure, rack mountable, holds various fiber adapter plates, splice trays, or MTP modules, based on connector choice and density requirements.
         1. 1RU Opt-X 1000i SDX rack-mount Fiber Optic Enclosure, empty, with sliding tray.

Capacity: 72 fiber strands (LC), 3 fiber adapter plates and 3 splice trays, or 3 MTP modules

Part Number: Leviton 5R1UM-S03.

* + - * 1. 2RU Opt-X 1000i SDX rack-mount Fiber Optic Enclosure, empty, with sliding tray.

Capacity: 144 fiber strands (LC), 6 fiber adapter plates and 6 splice trays, or 6 MTP modules

Part Number: Leviton 5R2UM-S06.

* + - * 1. 3RU Opt-X 1000i SDX rack-mount Fiber Optic Enclosure, empty.

Capacity: 216 fiber strands (LC), 9 fiber adapter plates and 9 splice trays, or 9 MTP modules

Part Number:  Leviton 5R3UM-F09.

* + - * 1. 4RU Opt-X 1000i SDX rack-mount Fiber Optic Enclosure, empty.

Capacity: 288 fiber strands (LC),12 fiber adapter plates and 12 splice trays, or 12 MTP modules

Part Number: Leviton 5R4UM-F12.

* + - 1. Opt-X Fiber Optic Wall-mount SDX Enclosures: All metal enclosure, holds various fiber adapter plates, splice trays, or MTP modules, based on connector choice and density requirements. Part numbers shown have a split metal door with key lock. Mini Enclosure has one door.
         1. Mini wall-mount SDX Fiber Optic Enclosure, empty.

Capacity: 24 fiber strands (LC), 1 fiber adapter plate, or 1 SDX MTP module

Capacity: Splicing 24 fiber strands (LC) or 12 fiber strand SC/ST with provided splice holders

Stackable up to three units

DIN Rail mountable with kit DNRAL-ACC

Zero RU mountable with kit 5WMNB-ACC

Part Number: Leviton 5WSML-01C.

* + - * 1. Small wall-mount SDX Fiber Optic Enclosure, empty.

Capacity: 48 fiber strands (LC), 2 fiber adapter plates and 2 Splice trays, or 2 MTP modules

Part Number: Leviton 5WSML-01C.

* + - * 1. Medium wall-mount SDX Fiber Optic Enclosure, empty.

Capacity: 96 fiber strands (LC), 4 fiber adapter plates and 4 splice trays, or 4 MTP modules

Part Number: Leviton 5WMED-04C.

* + - * 1. Large wall-mount SDX Fiber Optic Enclosure, empty.

Capacity: 288 fiber strands (LC),12 fiber adapter plates and 12 splice trays, or 12 MTP modules

Capacity: 576 fiber strands (Splice Only), 24 splice trays

Part Number: Leviton 5WLRG-12C.

* + - 1. Splice Trays
         1. 12-fiber Mini Splice Tray, 3.74” x 5.59”

Part Number: Leviton T5PLS-12F

* + - * 1. 24-fiber High-density Splice Tray, 4.5” x 7.63”

Part Number: Leviton T5PLS-24F

* + - 1. SDX Splice Modules
         1. Use for **OM3 Fiber Optic System,** **OM4 Fiber Optic System,** or **OM4+ Fiber Optic Systems with SDX enclosures or panels**

Opt-X 12-Fiber LC OM3 Splice Module

Part Number: Leviton SPLCS-12A

Opt-X 12-Fiber SC OM3 Splice Module

Part Number: Leviton SPSCS-12A

Opt-X 24-Fiber LC OM3 Splice Module

Part Number: Leviton SPLCS-24A

* + - * 1. Use for **OS2 Fiber Optic System**

Opt-X 12-Fiber LC OS2 Splice Module

Part Number: Leviton SPLCS-12L

Opt-X 12-Fiber LC/APC OS2 Splice Module

Part Number: Leviton SPLCS-12V

Opt-X 12-Fiber SC OS2 Splice Module

Part Number: Leviton SPSCS-12L

Opt-X 12-Fiber SC/APC OS2 Splice Module

Part Number: Leviton SPSCS-12V

Opt-X 24-Fiber LC OS2 Splice Module

Part Number: Leviton SPLCS-24L

Opt-X 24-Fiber LC/APC OS2 Splice Module

Part Number: Leviton SPLCS-24V

* + 1. **FIBER OPTIC ADAPTER PLATES**
       1. 62.5ɥm Multimode Adapter Plates, for **OM1 Fiber Optic System** and **OM2 Fiber Optic System**.
          1. 6-LC duplex (12-fiber) multimode OM1, beige adapter plate, zirconia-ceramic sleeves.

Part Number: Leviton 5F100-2IL.

* + - * 1. 6-LC quad (24-fiber) multimode OM1, beige adapter plate, zirconia-ceramic sleeves.

Part Number: Leviton 5F100-4IL.

* + - * 1. 6-SC duplex (12-fiber) multimode OM1,beige adapter plate, zirconia-ceramic sleeves.

Part Number: Leviton 5F100-2IC.

* + - * 1. 6-LC duplex (12-fiber) multimode OM2, black adapter plate, zirconia-ceramic sleeves.

Part Number:  Leviton 5F100-2EL.

* + - * 1. 6-LC quad (24-fiber) multimode OM2, black adapter plate, zirconia-ceramic sleeves.

Part Number:  Leviton 5F100-4EL.

* + - * 1. 6-SC duplex (12-fiber) multimode OM2, black adapter plate, zirconia-ceramic sleeves.

Part Number:  Leviton 5F100-2EC.

* + - 1. 50ɥm Laser-optimized Multimode (LOMM) Adapter Plates, for **OM3 Fiber Optic System**, **OM4 Fiber Optic System**, and **OM4+ Fiber Optic System**.
         1. 6-LC duplex (12-fiber) multimode OM3/OM4, aqua adapter plate, zirconia-ceramic sleeves.

Part Number: Leviton 5F100-2QL.

* + - * 1. 6-LC quad (24-fiber) multimode OM3/OM4, aqua adapter plate, zirconia-ceramic sleeves.

Part Number: Leviton 5F100-4QL.

* + - * 1. 6-SC duplex (12-fiber) multimode OM3/OM4, aqua adapter plate, zirconia-ceramic sleeves.

Part Number: Leviton 5F100-2QC.

* + - * 1. 6-LC duplex (12-fiber) multimode OM4+, purple adapter plate, zirconia-ceramic sleeves.

Part Number:  Leviton 5F100-2PL.

* + - * 1. 6-LC quad (24-fiber) multimode OM4+, purple adapter plate, zirconia-ceramic sleeves.

Part Number:  Leviton 5F100-4PL.

* + - 1. Single Mode Adapter Plates, for **OS2 Fiber Optic System**.
         1. 6-LC duplex (12-fiber) multimode OS1/OS2, blue adapter plate, zirconia-ceramic sleeves.

Part Number: Leviton 5F100-2LL.

* + - * 1. 6-LC quad (24-fiber) multimode OS1/OS2, blue adapter plate, zirconia-ceramic sleeves.

Part Number: Leviton 5F100-4LL.

* + - * 1. 6-SC duplex (12-fiber) multimode OS1/OS2, blue adapter plate, zirconia-ceramic sleeves.

Part Number: Leviton 5F100-2LC.

* + - 1. Opt-X HDX Fiber Adapter Plates (for Opt-X UHDX Fiber Enclosures and Panels) Use for **OM1 Fiber Optic System, OM3 Fiber Optic System, OM4 Fiber Optic System, OM4+ Fiber Optic System**, or **OS2 Fiber Optic System**, as noted
         1. OM1 & OM2, Quad LC (Beige), 12 fibers, Phosphor Bronze Sleeve

Part Number: Leviton 5FUHD-2IL

* + - * 1. OM3 & OM4, Quad LC (Aqua), 12 fibers, Zirconia Ceramic Sleeve

Part Number: Leviton 5FUHD-2QL

* + - * 1. OS2, Quad LC (Blue), 12 fibers, Zirconia Ceramic Sleeve

Part Number: Leviton 5FUHD-6LL

* + - * 1. OM1 & OM2, Duplex SC (Beige), 6 fibers, Phosphor Bronze Sleeve

Part Number: Leviton 5FUHD-6IC

* + - * 1. OM3 & OM4, Duplex SC (Aqua), 6 fibers, Zirconia Ceramic Sleeve

Part Number: Leviton 5FUHD-6QC

* + - * 1. OS2, Duplex SC (Blue), 6 fibers, Zirconia Ceramic Sleeve

Part Number: Leviton 5FUHD-6LC

* + - * 1. Duplex MTP Adapters (Black) Keyed Up to Keyed Up

Part Number: Leviton 5FUHD-6MB

* + - * 1. Duplex MTP Adapters (Black) Keyed Up to Keyed Down

Part Number: Leviton 5FUHD-6MP

* + - * 1. Opt-X HD Blank Adapter Plate (Black)

Part Number: Leviton 5FUHD-BLK

* + 1. **MTP FIBER OPTIC CASSETTE MODULES**
       1. Opt-X Unity 40/100 MTP Cassette Modules for 50ɥm LOMM fiber, OM3 and OM4. Use for **OM3 Fiber Optic System, OM4 Fiber Optic System,** or **OM4+ Fiber Optic System**
          1. Use configurator for optioning Opt-X Unity 40/100 MTP Cassettes

[www.leviton.com/configurator](http://www.leviton.com/configurators)

* + - 1. [www.leviton.com/configurator](http://www.leviton.com/configurators)Opt-X HD MTP Cassettes for Opt-X Ultra HD and Opt-X 1000i HD Fiber Enclosures
         1. Use configurator for optioning Opt-X HD MTP Cassettes

[www.leviton.com/configurator](http://www.leviton.com/configurators)

* + 1. **FIBER OPTIC CONNECTORS** 
       1. OM1 Multimode Fiber Optic Connectors (beige): Use for **OM1 Fiber Optic System**
          1. FastCure anerobic epoxy LC connector, 3mm boot.

Part Number: Leviton 49990-ML2.

* + - * 1. FastCure anerobic epoxy LC connector, 900 micron boot.

Part Number: Leviton 49990-MDL.

* + - * 1. FastCure anerobic epoxy SC connector.

Part Number: Leviton 49990-MSC.

* + - * 1. FastCam LC Connector

Part Number: Leviton 49991-MLC

* + - * 1. FastCam SC Connector

Part Number: Leviton 49991-MSC

* + - 1. OM2 Multimode Fiber Optic Connectors (black): Use for **OM2 Fiber Optic System**
         1. FastCam LC Connector

Part Number: Leviton 49991-5LC

* + - * 1. FastCam SC Connector

Part Number: Leviton 49991-5SC

* + - 1. OM3 and OM4 Laser-optimized Multimode (LOMM) Fiber Optic Connectors (aqua): Use for **OM3 Fiber Optic System, OM4 Fiber Optic System,** or **OM4+ Fiber Optic System**
         1. FastCure anerobic epoxy LC connector, 3mm boot.

Part Number: Leviton 49990-LL2.

* + - * 1. FastCure anerobic epoxy LC connector, 900 micron boot.

Part Number: Leviton 49990-LDL.

* + - * 1. FastCure anerobic epoxy SC connector.

Part Number: Leviton 49990-LSC.

* + - * 1. FastCam LC Connector

Part Number: Leviton 49991-LLC

* + - * 1. FastCam SC Connector

Part Number: Leviton 49991-LSC

* + - 1. OS1/OS2 Single Mode Fiber Optic Connectors (blue): Use for **OS2 Fiber Optic System**
         1. FastCure anerobic epoxy LC connector, 3mm boot.

Part Number: Leviton 49990-SL2.

* + - * 1. FastCure anerobic epoxy LC connector, 900 micron boot.

Part Number: Leviton 49990-SDL.

* + - * 1. FastCure anerobic epoxy SC connector.

Part Number: Leviton 49990-SSC.

* + - * 1. FastCam LC Connector

Part Number: Leviton 49991-SLC

* + - * 1. FastCam SC Connector

Part Number: Leviton 49991-SSC

* + - * 1. FastCam SC/APC Connector\*

Part Number: Leviton 49991-ASC

\*Requires Precision Angled Cleaver 49886-APC

* + 1. **FIBER OPTIC TERMINATION ENCLOSURES and SPLICE TRAYS.** Use for **OM1 Fiber Optic System**, **OM3 Fiber Optic System**, **OM4 Fiber Optic System**, **OM4+ Fiber Optic System**,and **OS2 Fiber Optic System**
       1. Opt-X UHDX Fiber Optic Enclosures: High-end appearance, metal and composite, rack mountable, holds various HDX fiber adapter plates or MTP cassettes, based on connector choice and density requirements.
          1. 1RU Opt-X UHD rack-mount Fiber Optic Enclosure, empty, with sliding trays.

Capacity: 144 fiber strands (LC), 12 MTP cassettes or 12 fiber adapter plates

Part Number:  Leviton 5R1UD-S12.

* + - * 1. 2RU Opt-X UHD rack-mount Fiber Optic Enclosure, empty, with sliding trays.

Capacity: 288 fiber strands (LC), 24 MTP cassettes or 24 fiber adapter plates

Part Number:  Leviton 5R2UD-S24.

* + - * 1. 4RU Opt-X UHD rack-mount Fiber Optic Enclosure, empty, with sliding trays.

Capacity: 576 fiber strands (LC), 48 MTP cassettes or 48 fiber adapter plates

Part Number:  Leviton 5R4UD-S48

* + - 1. Opt-X UHDX Fiber Optic Panels: Open architecture, metal, rack mountable, holds various HDX fiber adapter plates or MTP cassettes, based on connector choice and density requirements.
         1. 1RU Opt-X HDX 1RU rack-mount Fiber Optic Panel, Flat, empty.

Capacity: 144 fiber strands (LC), HDX 12 MTP cassettes, splice modules or fiber adapter plates

Part Number:  Leviton HDX1F-144.

* + - * 1. 1RU Opt-X HDX 1RU rack-mount Fiber Optic Panel, Angled, empty.

Capacity: 144 fiber strands (LC), HDX 12 MTP cassettes, splice modules or fiber adapter plates

Part Number:  Leviton HDX1A-144.

* + - * 1. Rear Cable Manager.

Mounts directly to all HDX panels

Part Number:  Leviton E2XHD-CMB.

* + - * 1. Front Cable Manager.

Mounts directly over all HDX panels.

1RU and 2RU options.

Removable door and horizontal cable management fingers

Part Numbers:  1RU - Leviton 5R1UX-CMT, 2RU 5R2UX-CMT.

* + - 1. Splice Modules: HDX splice modules with pre-ribbonized, color coded pigtails allowing ribbon or single fiber splicing without any additional preparatory steps. Compatible with all HDX Frames, enclosures, patch panels and adapter brackets
         1. Use for **OM3 Fiber Optic System,** **OM4 Fiber Optic System,** or **OM4+ Fiber Optic Systems with HDX enclosures or panels**

HDX 12-Fiber LC OM4 Splice Module, Shuttered LC, aqua

Part Number: Leviton SPLCH-12AQ

HDX 12-Fiber LC OM4 Splice Module, Non-Shuttered, LC aqua

Part Number: Leviton SPLCH-12A

HDX 12-Fiber LC OM4 Splice Module, Shuttered LC, heather violet

Part Number: Leviton SPLCH-1HV

HDX 12-Fiber LC OM4 Splice Module, Non-Shuttered LC, heather violet

Part Number: Leviton SPLCH-12M

HDX 36-Fiber MTP OM4 Splice Module, 3 port x 12F male

Part Number: Leviton SPMPH-MMPN

HDX 36-Fiber MTP OM4 Splice Module, 3 port x 12F female

Part Number: Leviton SPMPH-MMUP

* + - * 1. Use for **OS2 Fiber Optic System**

HDX 12-Fiber LC OS2 Splice Module, Shuttered LC, blue

Part Number: Leviton SPLCH-12BL

HDX 12-Fiber LC OS2 Splice Module, Non-Shuttered LC, blue

Part Number: Leviton SPLCH-12L

HDX 12-Fiber LC OS2 Splice Module, Shuttered LC/APC, green

Part Number: Leviton SPLCH-12GN

HDX 12-Fiber LC OS2 Splice Module, Non-Shuttered LC/APC, green

Part Number: Leviton SPLCH-12V

HDX 36-Fiber MTP OS2 Splice Module, 3 port x 12F male

Part Number: Leviton SPMPH-SMPN

HDX 36-Fiber MTP OS2 Splice Module, 3 port x 12F female

Part Number: Leviton SPMPH-SMUP

* + - 1. Opt-X 2000i SDX Fiber Optic Enclosures: High-end appearance, metal and composite, rack mountable, holds various fiber adapter plates, splice trays, or MTP modules, based on connector choice and density requirements.
         1. 1RU Opt-X 2000i SDX rack-mount Fiber Optic Enclosure, empty, with sliding tray.

Capacity: 72 fiber strands (LC), 3 fiber adapter plates and 3 splice trays, or 3 MTP modules

Part Number: Leviton 5R1UH-S03.

* + - * 1. 2RU Opt-X 2000i SDX rack-mount Fiber Optic Enclosure, empty, with sliding tray.

Capacity: 144 fiber strands (LC), 6 fiber adapter plates and 6 splice trays, or 6 MTP modules

Part Number: Leviton 5R2UH-S06.

* + - * 1. 4RU Opt-X 2000i SDX rack-mount Fiber Optic Enclosure, empty, with sliding tray.

Capacity: 288 fiber strands (LC),12 fiber adapter plates and 12 splice trays, or 12 MTP modules

Part Number: Leviton 5R4UH-S12.

* + - 1. Opt-X 1000i SDX Fiber Optic Enclosures: High-end features, all metal enclosure, rack mountable, holds various fiber adapter plates, splice trays, or MTP modules, based on connector choice and density requirements.
         1. 1RU Opt-X 1000i SDX rack-mount Fiber Optic Enclosure, empty, with sliding tray.

Capacity: 72 fiber strands (LC), 3 fiber adapter plates and 3 splice trays, or 3 MTP modules

Part Number: Leviton 5R1UM-S03.

* + - * 1. 2RU Opt-X 1000i SDX rack-mount Fiber Optic Enclosure, empty, with sliding tray.

Capacity: 144 fiber strands (LC), 6 fiber adapter plates and 6 splice trays, or 6 MTP modules

Part Number: Leviton 5R2UM-S06.

* + - * 1. 3RU Opt-X 1000i SDX rack-mount Fiber Optic Enclosure, empty.

Capacity: 216 fiber strands (LC), 9 fiber adapter plates and 9 splice trays, or 9 MTP modules

Part Number:  Leviton 5R3UM-F09.

* + - * 1. 4RU Opt-X 1000i SDX rack-mount Fiber Optic Enclosure, empty.

Capacity: 288 fiber strands (LC),12 fiber adapter plates and 12 splice trays, or 12 MTP modules

Part Number: Leviton 5R4UM-F12.

* + - 1. Opt-X Fiber Optic Wall-mount SDX Enclosures: All metal enclosure, holds various fiber adapter plates, splice trays, or MTP modules, based on connector choice and density requirements. Part numbers shown have a split metal door with key lock. Mini Enclosure has one door.
         1. Mini wall-mount SDX Fiber Optic Enclosure, empty.

Capacity: 24 fiber strands (LC), 1 fiber adapter plate, or 1 SDX MTP module

Capacity: Splicing 24 fiber strands (LC) or 12 fiber strand SC/ST with provided splice holders

Stackable up to three units

DIN Rail mountable with kit DNRAL-ACC

Zero RU mountable with kit 5WMNB-ACC

Part Number: Leviton 5WSML-01C.

* + - * 1. Small wall-mount SDX Fiber Optic Enclosure, empty.

Capacity: 48 fiber strands (LC), 2 fiber adapter plates and 2 Splice trays, or 2 MTP modules

Part Number: Leviton 5WSML-01C.

* + - * 1. Medium wall-mount SDX Fiber Optic Enclosure, empty.

Capacity: 96 fiber strands (LC), 4 fiber adapter plates and 4 splice trays, or 4 MTP modules

Part Number: Leviton 5WMED-04C.

* + - * 1. Large wall-mount SDX Fiber Optic Enclosure, empty.

Capacity: 288 fiber strands (LC),12 fiber adapter plates and 12 splice trays, or 12 MTP modules

Capacity: 576 fiber strands (Splice Only), 24 splice trays

Part Number: Leviton 5WLRG-12C.

* + - 1. Splice Trays
         1. 12-fiber Mini Splice Tray, 3.74” x 5.59”

Part Number: Leviton T5PLS-12F

* + - * 1. 24-fiber High-density Splice Tray, 4.5” x 7.63”

Part Number: Leviton T5PLS-24F

* + - 1. SDX Splice Modules
         1. Use for **OM3 Fiber Optic System,** **OM4 Fiber Optic System,** or **OM4+ Fiber Optic Systems with SDX enclosures or panels**

Opt-X 12-Fiber LC OM3 Splice Module

Part Number: Leviton SPLCS-12A

Opt-X 12-Fiber SC OM3 Splice Module

Part Number: Leviton SPSCS-12A

Opt-X 24-Fiber LC OM3 Splice Module

Part Number: Leviton SPLCS-24A

* + - * 1. Use for **OS2 Fiber Optic System**

Opt-X 12-Fiber LC OS2 Splice Module

Part Number: Leviton SPLCS-12L

Opt-X 12-Fiber LC/APC OS2 Splice Module

Part Number: Leviton SPLCS-12V

Opt-X 12-Fiber SC OS2 Splice Module

Part Number: Leviton SPSCS-12L

Opt-X 12-Fiber SC/APC OS2 Splice Module

Part Number: Leviton SPSCS-12V

Opt-X 24-Fiber LC OS2 Splice Module

Part Number: Leviton SPLCS-24L

Opt-X 24-Fiber LC/APC OS2 Splice Module

Part Number: Leviton SPLCS-24V

* + 1. **PATCH CORDS/JUMPERS**
       1. Multimode Fiber Optic Jumpers: Use for **OM1 Fiber Optic System**
          1. OM1, orange. Factory-terminated, double-ended, 2-strand multimode cordage.

Duplex LC-Duplex LC:

Leviton 62DLC-M01 (1 meter)

Leviton 62DLC-M02 (2 meter)

Leviton 62DLC-M03 (3 meter)

Leviton 62DLC-M05 (5 meter)

Leviton 62DLC-M10 (10 meter)

Duplex SC-Duplex SC:

Leviton 62DSC-M01 (1 meter)

Leviton 62DSC-M02 (2 meter)

Leviton 62DSC-M03 (3 meter)

Leviton 62DSC-M05 (5 meter)

Leviton 62DSC-M10 (10 meter)

* + - * 1. OM2, factory-terminated, double-ended, 2-strand multimode cordage. Use for **OM2 Fiber Optic System**

Duplex LC-Duplex LC:

Leviton 50DLC-M01 (1 meter)

Leviton 50DLC-M02 (2 meter)

Leviton 50DLC-M03 (3 meter)

Leviton 50DLC-M05 (5 meter)

Leviton 50DLC-M10 (10 meter)

Duplex SC-Duplex SC:

Leviton 50DSC-M01 (1 meter)

Leviton 50DSC-M02 (2 meter)

Leviton 50DSC-M03 (3 meter)

Leviton 50DSC-M05 (5 meter)

Leviton 50DSC-M10 (10 meter)

* + - 1. OM3, aqua. Factory-terminated, double-ended, 2-strand multimode cordage. Use for **OM3 Fiber Optic System, OM4 Fiber Optic System,** or **OM4+ Fiber Optic System**

Duplex LC-Duplex LC:

Leviton 5LDLC-M01 (1 meter)

Leviton 5LDLC-M02 (2 meter)

Leviton 5LDLC-M03 (3 meter)

Leviton 5LDLC-M05 (5 meter)

Leviton 5LDLC-M10 (10 meter)

Duplex SC-Duplex SC:

Leviton 5LDSC-M01 (1 meter)

Leviton 5LDSC-M02 (2 meter)

Leviton 5LDSC-M03 (3 meter)

Leviton 5LDSC-M05 (5 meter)

Leviton 5LDSC-M10 (10 meter)

* + - 1. Single Mode Fiber Optic Jumpers:
         1. OS1/OS2, yellow. Factory-terminated, double-ended, 2-strand multimode cordage, UPC polish. Use for **OS2 Fiber Optic System**

Duplex LC-Duplex LC:

Leviton UPDLC-S01 (1 meter)

Leviton UPDLC-S02 (2 meter)

Leviton UPDLC-S03 (3 meter)

Leviton UPDLC-S05 (5 meter)

Leviton UPDLC-S10 (10 meter)

Duplex SC-Duplex SC:

Leviton UPDSC-S01 (1 meter)

Leviton UPDSC-S02 (2 meter)

Leviton UPDSC-S03 (3 meter)

Leviton UPDSC-S05 (5 meter)

Leviton UPDSC-S10 (10 meter)

* 1. **EXECUTION** 
     1. **EXAMINATION**
        1. Examine areas to receive communications horizontal cabling.
        2. Notify Architect of conditions that would adversely affect installation or subsequent use.
        3. Do not begin installation until unacceptable conditions are corrected.
     2. **INSTALLATION – GENERAL**
        1. Install communications horizontal cabling in accordance with manufacturer’s instructions, ANSI/TIA-568.0-E, ANSI/TIA-568.1-E, ANSI/TIA-569-E, BICSI TDMM, and NFPA 70.
        2. Field Terminated Copper Patch Cords and Optical Fiber Jumpers: Not allowed.
        3. Copper Patch Cords: Manufactured by Leviton Network Solutions.
        4. Install cables after building interior has been physically protected from weather and mechanical work likely to damage cabling has been completed.
        5. Ensure cable pathways are completely and thoroughly cleaned before installing cabling.
        6. Inspect installed conduit, wireway, cable trays, and innerduct.
        7. Clean additional enclosed raceway and innerduct systems furnished.
        8. Provide protection for exposed cables where subject to damage.
        9. Abrasion Protection:
           1. Provide abrasion protection for cable or wire bundles which pass through holes or across edges of sheet metal.
           2. Use protective bushings to protect cables.
        10. Cable Ties and Other Cable Management Clamps:
            1. No more than hand tightened.
            2. Fit snugly, but not compress, crimp, or otherwise change physical characteristics of cable jacket or distort placement of twisted-pair components.
            3. Replace cables exhibiting stresses due to over tightening of cable management devices.
            4. Use plenum-rated cable ties in plenum spaces.
            5. Velcro™ brand tie-wraps are preferred over cable ties for all cable bundles. Plenum-rated Velcro™ brand tie-wraps are available from Leviton.
        11. Where possible, route cables in overhead cable trays and inside wire management systems attached to equipment cabinets and racks.
            1. Use Velcro™ brand tie-wraps, plastic ties or ducts to restrain cabling installed outside of wire management systems on racks or in cabinets.
            2. Cable Trays: Do not exceed 50 percent fill.
        12. Pull Cord:
            1. Nylon, 1/8-inch minimum.
            2. Co-install with cables installed in conduit.
        13. Cable Raceways: Do not fill greater than ANSI/TIA-569-E maximum fill for particular raceway type.
        14. Support horizontal cables at a maximum of 48-inch (1.2 to 1.5-m) irregular intervals, if J-hook or trapeze system is used to support cable bundles.
        15. Do not allow cables to rest on acoustic ceiling grids, plumbing pipes, or electrical conduits.
        16. Bundle horizontal distribution cables in groups of no more than amount of cables designed for by cable support manufacturer, based on cable OD and weight.
        17. Fire-Sprinkler System:
            1. Install cables above fire-sprinkler system.
            2. Do not attach cables to fire-sprinkler system or ancillary equipment or hardware.
            3. Install cable system and support hardware so that it does not obscure valves, fire alarm conduit, boxes, or other control devices.
        18. Do not attach cables to ceiling grid or lighting fixture wires.
        19. Install appropriate carriers to support cabling, where support for horizontal cables are required.
        20. Replace before final acceptance, cables damaged or exceeding recommended installation parameters during installation.
     3. **INSTALLATION –TWISTED-PAIR COPPER CABLES**
        1. Install twisted-pair copper cables in accordance with manufacturer’s instructions.
        2. Install cables in continuous lengths from origin to destination, without splices, except for transition points or consolidation points.
        3. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in enclosure intended and suitable for the purpose.
        4. Cable Minimum Bend Radius and Maximum Pulling Tension:
           1. Do not exceed bend radius for UTP and Shielded cable: 4 X Cable OD
           2. Install cables so that there are no bends smaller than 4X cable OD at any point in the run and at the termination field.
           3. Pulling Tension: Do not exceed 25 ft.lb.
        5. Separation from Power Lines: Provide following minimum separation distances between pathways for copper communications cables and power wiring of 480 volts or less:
           1. Open or Nonmetal Communications Pathways:

Electric motors, fluorescent light fixtures, and unshielded power lines carrying up to 3 kVA: 12 inches.

Electrical equipment and unshielded power lines carrying more than 5 kVA: 36 inches.

Large electrical motors or transformers: 48 inches.

* + - * 1. Grounded Metal Conduit Communications Pathways:

Electrical equipment and unshielded power lines carrying up to 2 kVA: 2-1/2 inches.

Electrical equipment and unshielded power lines carrying from 2 kVA to 5 kVA: 6 inches.

Electrical equipment and unshielded power lines carrying more than 5 kVA: 12 inches.

Power lines enclosed in grounded metal conduit (or equivalent shielding) carrying from 2 kVA to 5 kVA: 3 inches.

Power lines enclosed in grounded metal conduit (or equivalent shielding) carrying more than 5 kVA: 6 inches.

* + - 1. Coil cables to house cable coil without exceeding manufacturer’s bend radius.
         1. In hollow wall installations where box eliminators are used, store excess wire in wall.
         2. Store no more than 12 inches of cable slack.
         3. Loosely coil excess slack and store in ceiling above each drop location, when there is not enough space present in outlet box to store slack cables.
      2. Dress and terminate cables in accordance with ANSI/TIA-568.0-E, ANSI/TIA-568.1-E, BICSI TDMM, and manufacturer's instructions.
      3. Terminate 4-pair cables on jack and patch panels using T568-B or T568-A wiring scheme.
      4. Pair Untwist at Termination: Do not exceed 12 mm (1/2 inch).
      5. Neatly bundle cables and dress to their respective panels or blocks.
         1. Feed each panel or block by individual bundle separated and dressed back to point of cable entrance into rack or frame.
    1. **INSTALLATION – OPTICAL FIBER CABLES**
       1. Place fiber optic cables to maintain minimum cable bend radius limits specified by manufacturer or 15X cable OD, whichever is larger.
       2. Use care when handling fiber optic cables.
          1. Carefully monitor pulling tension so as not to exceed limits specified by manufacturer.
       3. Do not splice horizontal fiber optic cables.
       4. Coil cables to house cable coil without exceeding manufacturer’s bend radius.
          1. In hollow wall installations where box eliminators are used, store excess wire in wall.
          2. Store no more 36 inches of fiber slack.
          3. Loosely coil excess slack and store in ceiling above each drop location, when there is not enough space present in outlet box to store slack cables.
    2. **FIELD QUALITY CONTROL** 
       1. Cables and Termination Hardware: Test 100 percent for defects in installation and verify cabling system performance under installed conditions in accordance with ANSI/TIA-568.0-E.
          1. Verify all pairs of each installed cable before system acceptance.
          2. Defects in cabling system installation, including but not limited to cables, connectors, patch panels, and connector blocks shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed.
       2. Test all cables in accordance with this specification section, ANSI/TIA-568.2-D, and ANSI/TIA-568.3-D standards, and Leviton Network Solutions instructions
          1. If any of these are in conflict, bring discrepancies to the attention of the Architect for clarification and resolution.
       3. Cables, Jacks, Connecting Blocks, and Patch Panels:
          1. Verify all pairs of each installed cable before system acceptance.
          2. Defects in cabling system installation, including but not limited to cables, connectors, patch panels, and connector blocks shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed.
       4. Testing Twisted-Pair Copper Cables: (**NOTE: Permanent Link Test results are recommended, and are the expected norm** –unless patch cords that will remain installed at the work area and cross-connect are also being tested, in which case Channel Test results would be expected and accepted).
          1. Test twisted-pair copper cable links for continuity, pair reversals, shorts, opens, and performance as specified.

Additional testing is required to verify Category performance.

Test horizontal cabling using approved certification tester for Category 6A, Category 6, and Category 5e performance compliance in accordance with ANSI/TIA-568.2-D.

* + - * 1. Test Equipment: Certification tester (Note: Appropriate Fluke, Ideal, Viavi, Psiber, Softing, or AEM testers may be used).
        2. Basic Tests Required:

Wire map.

Length (feet).

Insertion loss (dB), formerly attenuation.

NEXT (Near end crosstalk) (dB).

Return loss (dB).

ELFEXT (dB).

Propagation delay (ns).

Delay skew (ns).

PSNEXT (Power sum near-end crosstalk loss) (dB).

PSELFEXT (Power sum equal level far-end crosstalk loss) (dB).

* + - * 1. Test Category 6A to 500 MHz.

Alien Crosstalk (AXT) testing and AXT test results are NOT required by Leviton for warranty of a Category 6A system. (**Note**: AXT testing may be required by the customer, in which case these tests WOULD have to be performed).

* + - * 1. Test Category 6 to 250 MHz.
        2. Test Category 5e to 100 MHz.
        3. Provide test results in approved certification testers original software format, with the following minimum information per cable:

Circuit ID.

Information from specified basic tests required.

Test Result: “PASS” or “FAIL”.

Date and time of test.

Project name.

NVP.

Software version.

* + - * 1. An occasional asterisk-Pass (\*PASS) will be accepted by Leviton at the manufacturer’s discretion, but rework of these links should be accomplished in an attempt to achieve clean “PASS” results prior to submission of test results.
        2. To receive Manufacturer’s Warranty for the project, submit software copy of test results, in original tester software format, to the Owner and to the Manufacturer (Leviton).
        3. Report in writing to the Owner immediately, along with copy of test results, failed test results that cannot be remedied through re-termination (as in the case of reversed or split pairs).
      1. Optical Fiber:
         1. Testing procedures shall be in accordance with the following:

ANSI/TIA-568.3-D Tier 1

One jumper reference required for duplex testing

Single mode testing per ANSI/TIA-526-7, Method A1.1.

Multimode testing per the TSB-4979 and TIA-526-14-B standards including one cord reference and encircled flux compliance

Magnified end face inspection per the IEC 61300-3-35 standard.

* + - * 1. Test Equipment: Certification tester (Note: Appropriate Fluke, Ideal, Viavi, Psiber, Softing, or AEM testers may be used).
        2. Testing:

Test optical fibers at both 850 nm and 1300 nm wavelengths for multimode, 1310 nm and 1550 nm wavelengths for single mode, end-to-end insertion loss, Telecommunications Room (TR) to Telecommunications Outlet (TO), Telecommunications Outlet (TO) to Telecommunications Room (TR).

Maximum insertion loss for horizontal fiber optic cables without consolidation point: 2.0 dB.

Test horizontal fiber runs TR to TO, TO to TR, at wavelength of operation to desktop applications.

* + - * 1. Submit software copy of test results, in original tester software format, to the Owner and to the Manufacturer (Leviton).
    1. **LABELING**
       1. All labeling is to be in accordance with ANSI/TIA-606-C and manufacturer’s instructions.
       2. Label horizontal cables using machine-printed label at each end of cable at approximately 12 inches from termination point and again at approximately 48 inches from termination point.
          1. Handwritten Labels: Not acceptable.
       3. Label patch panel ports and TO ports with cable identifier.
       4. Labels: Denote TO ID and unique cable number for that TO, i.e. A-001-A for cable number 1, A-001-B for cable number 2, and so forth.
          1. Owner may provide specific labeling requirements. Coordinate with the Owner.
       5. Note labeling information on as-built drawings.
    2. **PROTECTION**
       1. Protect installed communications horizontal cabling from damage during construction.

**END OF SECTION**