

# Leviton Voice & Data Category 6 Cabling Specification

## GENERAL

1. The following specification and its associated drawings are intended to provide a set of instructions and materials needed to furnish and install Telecommunications Cabling, within parameters set by industry standards, in a new or remodeled facility.
  - A. The information is modular in nature.
    1. Each facility will have one or more of each module discussed.
    2. Specifically included in this specification are cables, connecting hardware and channel performance requirements to provide a Category 6 compliant channel to each data port of the workstations.
  - B. Some of the information contained in the following is directed to the owner's architects, electrical, mechanical, and structural engineers. This information points toward ideal conditions and may vary by site depending on actual conditions.

### Basic Communications Requirements

#### 1. Codes and Standards Compliance

- A. All materials shall comply with the applicable sections of the following Codes for installation of telecommunications cabling:
  1. Uniform Building Code (UBC)
  2. National Electrical Code (NEC/NFPA 70)
  3. National Electrical Safety Code (NESC IEEE C 2)
  4. Local Codes, amendments, and ordinances.
- B. All materials and installation practices shall comply with the applicable sections of the following Telecommunications Industry Standards:
  1. ANSI/TIA/EIA-568-B.1-2001, Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
  2. ANSI/TIA/EIA-568-B.2-2001, Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
  3. ANSI/TIA/EIA-568-B.3-2000, Commercial Building Telecommunications Cabling Standard, Part 3: Optical Fiber Cabling Components Standard.
  4. ANSI/TIA/EIA-568-B.2-1: Transmission Performance Specification for 4-Pair 100  $\Omega$  Category 6 Cabling (Standard).
  5. ANSI/TIA/EIA-569-A-2001 (Including 5 addendums), Commercial Building Standards for Telecommunications Pathways and Spaces
  6. ANSI/EIA/TIA-570-1991, Residential and Light Commercial Telecommunications Wiring Standard
  7. ANSI/TIA/EIA-606-1993, The Administration Standard for the Telecommunications infrastructure of Commercial Building
  8. ANSI/TIA/EIA-607-1994, Commercial Building Grounding and Bonding Requirements for Telecommunications
- C. Installers shall have read the above documents and shall be familiar with the requirements that pertain to this installation. The documents may be obtained from:
  1. Global Engineering Documents, 15 Inverness Way East, Englewood, CO, 80112-5776, 800-854-7179, fax: 303-397-2740, <http://global.his.com/>
  2. IEEE-Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY, 10017-2394, 800-678-IEEE, fax: 732-981-9667, <http://standards.ieee.org/>

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- D. This document does not replace any Code, local or otherwise. The contractor must be aware of local Codes that may impact this project.
- E. Approved Contractor:
  - 1. The Telecommunications Contractor shall be an approved Leviton Certified Installer for at least 90 days.
  - 2. A copy of the certification documents shall be submitted with the quote.
  - 3. The System installer must have an RCDD approve the project design.
  - 4. The owner reserves the right to require the Contractor to remove from the project any such employee the Owner deems to be incompetent, careless or insubordinate.
  - 5. All clean up activity related to work performed will be the responsibility of the Low Voltage Contractor and must be completed daily before leaving the site.
  - 6.
- F. Pre-Installation Conference:
  - 1. Schedule a conference a minimum of five calendar days prior to beginning work of this Section.
  - 2. Agenda: Clarify questions related to work to be performed, scheduling, coordination, etc.
  - 3. Attendance: Communications System installer, General Contractor, Architect, Owner's representatives, and other parties affected by work of this Section.
- G. WARRANTY
  - 1. A Lifetime Performance Warranty covering all components, equipment and workmanship shall be submitted in writing with system documentation. The warranty period shall begin on the system's first use by the owner.
  - 2. The project must be pre-registered with Leviton before installation has begun.
  - 3. Should the cabling system fail to perform its expected operation within this warranty period due to inferior or faulty material and/or workmanship, the contractor shall promptly make all required corrections without cost to the owner.

## Communications Equipment Rooms

### 1. Equipment Racks:

- A. Provide racks equipped as detailed on the Drawings and as follows:
  - 1. Specified finish is manufacturers standard black finish.
  - 2. Where finish is indicated on the drawings to be other than black, that finish shall apply to all rack components with optional "custom/finish" selections.
  - 3. Provide 19.0" wide x 84.0" (7'-0") tall
  - 4. The number of vertical rack sections as required to allow space for terminating all communications cabling indicated on the drawings, plus mounting space for all owner supplied active components/equipment required to cross-connect to any/all modular jack ports on the patch panels.

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- B. Special Grounding Requirements
  - 1. Distribution Rack Grounding
  - 2. Furnish ground terminal block for each rack section located in the MC.
  - 3. Rack shall be grounded using #6 AWG stranded, insulated copper conductor.
  - 4. Furnish all required bonding material (racks and runway) and hardware, and bond to nearest TMGBB. Refer to ANSI/TIA/EIA-607-1994, Commercial Building Grounding and Bonding Requirements for Telecommunications, for details.
- C. Power Protection Strips:
  - 1. Equip each equipment rack or section thereof, with one plug strip (do not power station cable racks).
- D. Cable Runway:
  - 1. Equip each rack with cable raceways as shown on the drawings.
  - 2. Securely attach to backboard and rack in accordance with manufacturer's written instructions.
- E. Cable Raceway Bend Radii:
  - 1. Equip each 19.0" rack as necessary.
- F. Cable management:
  - 1. Provide and install Leviton brand Velcro cable management.
- G. Cable management panel:
  - 1. Provide and install Leviton 3.5"H cable management panels as shown on the construction drawings. Leviton "Spacemaker" panels also are acceptable.
- H. Optical fiber cable management panel:
  - 1. Provide and install one Leviton optical fiber cable management panel for each rack mounted optical fiber cabinet to be installed in equipment racks.
  - 2. Mount directly below the optical fiber cabinet.
  - 3. Provide and install Leviton 1.75"H cable management panels for wire management in wall mount enclosures. Leviton "Spacemaker" panels also are acceptable.

## Backbone Cabling Requirements

### 1. Multi-mode Optical Fiber Cables (Intrabuilding Data Backbone) shall be used to interconnect Telecommunications Closets

- A. Superior Essex Type OFNR/OFNP Distribution Cable:
  - a. Glass Type
    - 1. 50 / 125 Multimode
  - b. Optical Attenuation
    - 1. 3.50 dB/km @ 850 nm
    - 2. 1.25 dB/km @ 1300 nm
  - c. Bandwidth
    - 1. 500 MHz-km @ 850 nm
    - 2. 500 MHz-km @ 1300 nm

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- B. Superior Essex Type OFNR/OFNP Distribution Cable:
  - 1. Glass Type
    - a. 62.5 / 125 Multimode
  - 2. Optical Attenuation
    - a. 3.50 dB/km @ 850 nm
    - b. 1.25 dB/km @ 1300 nm
  - 3. Bandwidth
    - a. 200 MHz-km @ 850 nm
    - b. 500 MHz-km @ 1300 nm
- C. Cable shall be reinforced with Aramid strength members, and contain no metallic elements.
- D. Factory test reports, and contractor's acceptance tests, must accompany each spool or reel of cable.

## Horizontal Cabling Requirements

### 1. Copper Cabling

- A. Horizontal UTP Cable
  - 1. Superior Essex DataGain Cat 6 Plenum or Non Plenum
- B. Faceplates and Jacks Telecommunications Outlets – Work Area
  - 1. Leviton eXtreme™ 6+ (p/n 61110-R\*6) QuickPort® Telecommunications Outlet Connector Module
  - 2. Category 6 modular jack devices, 8-position, 8-conductor modular jacks, terminated to 110 type IDC connections for the installation of UTP cable.
  - 3. Furnish additional modules for 3 through 12 modular jack devices where indicated on the Drawings
  - 4. Units shall be labeled in accordance with both wiring designations T568A/B, See details for cable connections and labeling.
  - 5. Provide and install blank inserts as needed.
  - 6. Provide and install faceplates for mounting telecommunication outlet connector modules described above. Leviton single-gang faceplate or Leviton double-gang faceplate, as required.
  - 7. Leviton eXtreme™ 6+ Patch Cords (p/n 62460-xx\*) (Delivered to the Owner), the quantity, color, and length shall be supplied as required.
- C. Patch Panels – Telecommunications Room
  - 1. Leviton eXtreme™ 6+ (p/n 69270-U\*\*) QuickPort® Patch Panel
  - 2. Leviton eXtreme™ 6+ (p/n 69586-U\*\*) Universal Patch Panel
  - 3. Leviton eXtreme™ 6+ (p/n 6W587-U48) Angled Patch Panel

### 2. Fiber Cabling

- A. Horizontal Fiber Cable
  - 1. Superior Essex Type OFNR/OFNP Distribution Cable
    - a. Glass Type
      - 1 50 / 125 Multimode
    - b. Optical Attenuation
      - 1 3.50 dB/km @ 850 nm
      - 2 1.25 dB/km @ 1300 nm
    - c. Bandwidth
      - 1 500 MHz-km @ 850 nm
      - 2 500 MHz-km @ 1300 nm

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2. Superior Essex Type OFNR/OFNP Distribution Cable
    - a. Glass Type
      - 1 62.5 / 125 Multimode
    - b. Optical Attenuation
      - 1 3.50 dB/km @ 850 nm
      - 2 1.25 dB/km @ 1300 nm
    - c. Bandwidth
      - 1 200 MHz-km @ 850 nm
      - 2 500 MHz-km @ 1300 nm
  - B. Faceplates and Jacks Telecommunications Outlets
    1. Optical Fiber Connectors
      - a. Leviton Opt-X™ Fast Cure Epoxy ST/SC/FC/LC Connector
      - b. Provide and install optical fiber connectors, multi-mode, for connection at optical fiber cabinets.
  - C. Optical Fiber Duplex Patch Cords for the connection of optical fiber equipment to optical fiber patch panel or outlet connectors.
    1. Cords shall consist of 62.5/125 micrometer dual-fiber jumper cordage with appropriate connectors on each end.
      - a. Leviton Opt-X™ Patch Cords
      - b. Quantity, length, and configuration as needed.
      - c. Factory test reports must accompany each patch cord.
  - D. Modular Patch Panels Rack Mounted optical Fiber Cabinet
    1. Provide and install Leviton rack mounted modular cabinets complete with ST/SC/FC/LC/MT-RJ connector couplings mounted in ST/SC/FC/LC/MT-RJ connector panels for interconnection/cross-connection of multi-mode optical fiber cables as specified herein.
      - a. Leviton Opt-X™ Patch Panels
      - b. Units shall be sized to accommodate required strand counts.
      - c. Provide blank adapter panels as required, for future growth.
- 3. Leviton Channel Performance**
- A. UTP testing shall be performed using a Level IV tester.
  - B. 100% of the cables shall be tested and all test results turned into Leviton to provide a Lifetime Warranty.
  - C. The following test performance values are for the Category 6 Channel Test:
    1. Values listed in the following table are for information purposes. The actual limits are based on formulas.
    2. Values are worse case guaranteed performance.

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Frequency MHz	Insertion Loss dB		Worst Pair Combination (dB)					
			NEXT		ELFEXT		ACR	
	CAT 6 568-B.2-1	Guaranteed Max.	CAT 6 568-B.2-1	Guaranteed Min.	CAT 6 568-B.2-1	Guaranteed Min.	CAT 6 568-B.2-1	Guaranteed Min.
1	2.1	1.9	65.0	77.2	63.3	66.8	62.9	75.3
4	4.0	3.7	63.0	67.2	51.2	54.7	59.0	66.5
8	5.7	5.3	58.2	62.2	45.2	48.7	52.5	59.9
10	6.3	6.0	56.6	60.6	43.3	46.8	50.3	57.7
16	8.0	7.6	53.2	57.2	39.2	42.7	45.2	52.6
20	9.0	8.6	51.6	55.6	37.2	40.7	42.6	50.0
25	10.1	9.7	50.0	54.0	35.3	38.8	39.9	47.4
31.25	11.4	10.9	48.4	52.4	33.4	36.9	37.0	44.5
62.5	16.5	15.8	43.4	47.4	27.3	30.8	26.9	34.7
100	21.3	20.3	39.9	44.0	23.3	26.8	18.6	26.7
200	31.5	29.8	34.8	39.0	17.2	20.7	3.3	12.2
250	35.9	33.8	33.1	37.4	15.3	18.8	-2.8	6.6
300		37.7		32.1		13.7		
350		41.1		31.0		12.4		

Frequency MHz	Min Return Loss dB		Power Sum (dB)					
			NEXT		ELFEXT		ACR	
	CAT 6 568-B.2-1	Guaranteed Min.	CAT 6 568-B.2-1	Guaranteed Min.	CAT 6 568-B.2-1	Guaranteed Min.	CAT 6 568-B.2-1	Guaranteed Min.
1	19.0	23.0	62.0	75.8	60.3	65.8	59.9	73.9
4	19.0	23.0	60.5	65.8	48.2	53.7	56.5	64.1
8	19.0	23.0	55.6	60.8	42.2	47.7	49.9	57.5
10	19.0	23.0	54.0	59.2	40.3	45.8	47.7	55.3
16	18.0	23.0	50.6	55.8	36.2	41.7	42.6	50.2
20	17.5	23.0	49.0	54.2	34.2	39.7	40.0	47.6
25	17.0	22.0	47.3	52.6	32.3	37.8	37.2	45.0
31.25	16.5	21.1	45.7	51.0	30.4	35.9	34.3	42.1
62.5	14.0	18.1	40.6	46.0	24.3	29.8	24.1	32.3
100	12.0	16.0	37.1	42.6	20.3	25.8	15.8	24.3
200	9.0	13.0	31.9	37.6	14.2	19.7	0.4	9.8
250	8.0	12.0	30.2	36.0	12.3	17.8	-5.7	4.2
300		7.2		30.7		10.7		
350		6.6		29.6		9.4		