

SPECIFICATION STANDARD

Communications Optical Fiber

Horizontal Cabling 27 15 23

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation, termination, and labeling of horizontal optical fiber infrastructure as described on the Drawings and/or required by these specifications.

1.02 RELATED SECTIONS

- A. Division 26 Electrical
- B. Division 27 Communications Systems
- C. Division 28 Electronic Safety and Security

PART 2: PRODUCTS

2.01 FIBER CABLING

- A. Single-mode Fiber Optic Outlet Cable - Provide horizontal fiber optic cable from the outlet through conduits to the cable tray and then through the cable tray to TR or ER.
- B. Each single-mode fiber optic cable shall be a MIC-type tight buffered fiber. Typical fiber outlets consist of a two-strand fan out type. The number of strands may vary depending on the project.
- C. Multimode Fiber Optic Outlet Cable - Provide horizontal fiber optic cable from the outlet through conduits to the cable tray and then through the cable tray to TR or ER.
- D. Each multimode fiber optic cable shall be a MIC-type tight buffered fiber. Typical fiber outlets consist of a two-strand fan-out type fiber. The number of strands may vary depending on the project.

2.02 MANUFACTURER

Approved Manufacturers:

- 1. Ortronics/Superior Essex
- 2. AFL / Dura-Line
- 3. Ber-Tek

PART 3: EXECUTION

SPECIFICATION STANDARD

Communications Optical Fiber

Horizontal Cabling 27 15 23

3.01 FIBER OPTIC CABLE INSTALLATION

- A. This Section describes the installation locations for the products and materials, as well as methods and UNM IT Standards associated with the Telecommunications Installation portions of the Project. These Specifications, along with the drawings and other UNM IT-supplied specifications shall be followed during the installation.
- B. The Contractor is instructed to coordinate his efforts with the other tradesmen who may be working within the same vicinity to avoid conflict and lost time.
- C. The Contractor is required to supply all necessary tools, equipment, accessories, safety equipment, protective clothing, etc., as customary for the craft and necessary for the installation.
- D. The Contractor shall verify space requirements and locations with UNM IT before starting cable installations and terminations.
- E. The Contractor shall verify the cable type and jacket rating required with UNM IT before starting fiber installation.
- F. The Contractor shall verify existing cable fill in conduit, raceway, or cable tray system before installation of additional cables so as not to exceed 40% cable fill. The contractor will be responsible for the installation of additional conduit, raceway, or cable tray where additional cables to be added will exceed the 40% cable fill. See cable fill attachment, 3.1 Attachment #1.

3.02 EMPTY STATION CONDUITS

- A. Provide a nylon pull cord in each empty conduit and extended it in the raceway to openings for faceplates to facilitate future installation of cables.

3.03 HORIZONTAL FIBER CABLING

- A. The horizontal fiber cabling will be terminated at the TR or ER in a rack-mountable enclosure.
- B. The contractor is responsible to obtain and follow manufacturer installation instructions for cable installation, correct termination, and fiber management of cables.
- C. UNM IT will provide future cross-terminations to network equipment.

3.05 FIBER COLOR CODES

SPECIFICATION STANDARD

Communications Optical Fiber

Horizontal Cabling 27 15 23

- A. Fiber Color Code
 - 1. Blue
 - 2. Orange
 - 3. Green
 - 4. Brown
 - 5. Slate
 - 6. White
 - 7. Red
 - 8. Black
 - 9. Yellow
 - 10. Violet
 - 11. Rose
 - 12. Aqua

3.06 GENERAL FIBER INSTALLATION

- A. Cable lengths within boxes shall be adequate to permit installation and removal of the device for inspection without damage to cable or connections (minimum of 12").
- B. Cable bends shall not be greater than that recommended by the manufacturer of the cable.
- C. Care shall be taken so as not to damage the cable during the installation process and that manufacturer's pull tension specification is not exceeded.
- D. Route cables so that no horizontal cable exceeds 90 meters between TR termination and device jack termination. Contact UNM IT if this is not possible at the TR location.
- E. Provide a minimum of 8'-0" and a maximum of 10'-0" of slack. Loop at the TRs shall be contained within the fiber enclosure.
- F. Within TRs, cables shall be snugly wrapped using Velcro reusable cable ties, a minimum of every 3'-0" for cable organization. Velcro ties shall be tightened so as not to deform cable jackets and thus affect cable performance.
- G. Cable fill in station conduits, raceway, and cable tray shall not exceed 40% cable fill.
- H. New TRs must be free from dust, dirt, and other foreign materials before the installation of any termination hardware or the termination of copper or fiber optic cables. The door to the telecommunication rooms must be installed and closed during termination. The door shall be locked when unoccupied. The IT room shall be dust free during the termination process and remain so thereafter.

SPECIFICATION STANDARD

Communications Optical Fiber

Horizontal Cabling 27 15 23

3.07 CABLE TESTING

- A. A 100% verification by UNM IT of all horizontal fiber cable tests will be performed. The contractor shall notify UNM IT before the start of testing.
- B. The fiber optic cables shall be tested utilizing a power meter and stabilized light source capable of testing at 850 nm and 1300 nm for multimode and 1310nm and 1550nm for single mode. The contractor shall complete a fiber optic post-installation report at the time of testing containing meter readings at both 850 nm and 1300 nm for multimode and 1310nm and 1550nm for single mode in one direction (TR to outlet) on each fiber. Actual loss and other pertinent data regarding the cables tested, including model and the serial number of test equipment, cable part #, installed fiber length, building span loss at 850 nm and 1300 nm for multimode and 1310nm and 1550nm for single-mode and date tested. The fiber optic post-installation report shall be in a form substantially similar to 3.7 Attachment 1. The testing required is 100%. Place in a 3-ring binder, preceded by a tabbed divider, and label as "Horizontal Fiber". Span loss calculations are required on the final test sheet for loss at 850 nm and 1300 nm for multimode and 1310nm and 1550nm for single mode.

$$(D \times L) + (C \times \# \text{ connectors})$$

D = Length; L = Loss; C = Connector loss (Max 0.5 dB)

1 ft. = Per Part NO. & Manufacturer Specification

- C. UNM IT will perform random verification testing as part of the acceptance of all fiber optic cable testing.

3.08 EQUIPMENT INSTALLATION AND CABLE TERMINATIONS

- A. All equipment shall be installed neatly and professionally and arranged for convenient operation, testing, and future maintenance.
- B. All fiber cables shall be installed and terminated by technicians experienced in the installation and termination of fiber cables.
- C. The Contractor shall employ certified system installation technicians and have at least 5 years of experience in the installation of similar and/or equivalent systems.
- D. The Contractor shall supply verification of experience, for this type of work, to UNM for approval before performing any work.

SPECIFICATION STANDARD

Communications Optical Fiber

Horizontal Cabling 27 15 23

3.09 AS-BUILT INFORMATION

- A. The contractor shall provide as-built information to UNM IT to accompany all test result information.
- B. As-built information shall be in electronic format (PDF). Indicate the location of all outlets, distribution cable trays, junction boxes, and all additions and deletions related to telecommunications. Include correct outlet labeling next to all telecom symbols.

3.10 SYSTEM WARRANTY REQUIREMENTS

- A. All work shall be done to the Manufacturer's warranty requirements.
- B. The contractor shall perform all labeling requirements and provide testing documentation for verification as described herein.
- C. The contractor shall submit cable records to reflect all moves, adds, and changes.
- D. The contractor shall provide floor plans showing the locations of all telecommunication outlets and spaces.

END SECTION