

**SECTION 27 13 23****COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. This section shall govern the products and installation of optical fiber (single-mode and multimode).

## 1.2 RELATED DOCUMENTS

- A. The latest versions of the following codes, standards, and guidelines shall be followed. Bring to ITS' immediate attention where construction documents or conditions differ from requirements in codes, standards, guidelines and specifications.

- B. The following codes, as required by law:

1. National Electric Code (NEC)
2. ANSI/IEEE C2 – National Electrical Safety Code

- C. The following standards:

1. TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
2. ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises
3. ANSI/TIA-568-C.3, Optical Fiber Cabling Components Standard.
4. ANSI/TIA/EIA-604-10A, FOCIS 10, Fiber Optic Connector Intermatability Standard – Type LC
5. TIA-492AAAD, Detail Specification for 850- $\mu$ m Laser-Optimized, 50- $\mu$ m Core Diameter/125- $\mu$ m Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers Suitable for Manufacturing OM4 Cabled Optical Fiber
6. ANSI/TIA-758-A, Customer-Owned Outside Plant Telecommunications Infrastructure Standard
7. ANSI/TIA/EIA-455-1-B-2003, Cable Flexing for Fiber Optic Interconnecting Devices
8. ANSI/TIA/EIA-455-2-C-1998, Impact Test Measurements for Fiber Optic Devices
9. ANSI/TIA/EIA-455-4-C-2002, Fiber Optic Component Temperature Life Test
10. ANSI/TIA/EIA-455-5-C-2002, Humidity Test Procedure for Fiber Optic Components
11. TIA-455-6-B-2003, Cable Retention Test Procedure for Fiber Optic Cable Interconnecting Devices
12. ANSI/TIA/EIA-455-8-2000, Measurement of Splice or Connector Loss and Reflectance Using an OTDR
13. TIA-455-13-A-2002, Visual and Mechanical Inspection of Fiber Optic Components, Devices, and Assemblies
14. TIA-455-21-A-2002, Mating Durability for Fiber Optic Interconnecting Devices

15. ANSI/TIA/EIA-455-34-A-2002, Interconnection Device Insertion Loss Test
16. TIA-455-36-A-2002, Twist Test for Fiber Optic Connecting Devices
17. ANSI/TIA-455-78-B-2002, Optical Fibers Part 1-40: Measurement Methods and Test Procedures – Attenuation
18. TIA-455-107-A-2004, Determination of Component Reflectance or Link/System Return Loss Using a Loss Test Set
19. ANSI/TIA/EIA-455-171-A-2001, Attenuation by Substitution Measurement for Short-Length Multimode Graded-Index and Single-Mode Optical Fiber Cable Assemblies
20. ANSI/TIA/EIA-455-185-1999, Strength of Coupling Mechanism for Fiber Optic Interconnecting Devices
21. TIA-492CAAB-2005, Detail Specification for Class IVa Dispersion-Unshifted Single-mode Optical Fibers With Low Water Peak
22. TIA 472C000-B/ICEA S-83-596-2001, Fiber Optic Premises Distribution Cable
23. TIA 472D000-B/ICEA S-87-640-1999, Fiber Optic Outside Plant Communications Cable
24. TIA 472E000/ICEA S-104-696-2003, Standard For Indoor-Outdoor Optical Cable
25. TIA 472F000/ICEA S-110-717-2003, Optical Drop Cables• ANSI/TIA/EIA-455-188-2001, Low-Temperature Testing of Fiber Optic Components

D. The following guidelines:

1. BICSI, Telecommunications Distribution Methods Manual (TDMM)
2. BICSI, Information Transport Systems Installation Methods Manual (ITSIMM)

E. The following project specifications:

1. 27 05 53 Identification for Communications Systems

### 1.3 SUBMITTALS

A. The following submittals are due at the Pre-Construction Phase, in accordance with submittal requirements in Section 27 00 00 Communications:

1. Product Information
  - a) Provide manufacturer's product information cutsheet or specifications sheet with the specific product number identified or filled out.
2. Shop Drawings
  - a) Provide scaled drawings (not less than 1/8" = 1'-0") indicating routing of cable and type of pathway, including all pull points (to include pullboxes, communications LB, etc.). *These locations are to be fully coordinated with all other trades.*

B. The following submittals are due Post-Construction, in accordance with the submittal requirements in Section 27 00 00 Communications:

1. Record Drawings

- a) Provide scaled drawings (not less than 1/8" = 1'-0") indicating actual installed routing of fiber and type/locations of all pathways and pull points. Design or shop drawings modified in the field will not be accepted.

2. Manufacturer and Maintenance Manuals for all installed equipment

#### 1.4 QUALITY ASSURANCE

- A. All backbone optical fiber cable installation shall be performed in a neat and workmanlike manner.
- B. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based on the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to the approval of The University of Texas at Austin Design and Planning Department on submittals provided.
- C. Trained technicians who have successfully attended an optical fiber training program, which have obtained a certificate as proof their installation knowledge shall install the backbone optical fiber cabling. Proof of optical fiber training shall be carried by the technician while performing any work. If proof is not provided on site, the technician may be excused from the site at no cost to the University. These certificates may have been issued by any of the following organizations or an equivalent organization:
  1. Manufacturer of the fiber optic cable and/or the fiber optic connectors.
  2. Training organizations (e.g., BICSI, A Telecommunications Association).

#### 1.5 DEFINITIONS

- A. FDU – Fiber distribution unit. A rack-mounted fiber housing unit.

### PART 2 – PRODUCTS

#### 2.1 CABLE

- A. The Advanced System Warranty as required by Section 27 00 00 shall govern cable manufacturer selection.
- B. Indoor/outdoor cable shall include a water-blocking material.
- C. Meet the environmental requirements for the area into which it is placed. For example, cabling placed in plenum space shall be listed as OFNP.
- D. Optical fibers shall be industry-standard color coded in accordance with ANSI/TIA-598-C
- E. Singlemode Fiber
  1. Singlemode cable shall:
    - a) Meet OS2 fiber requirements (TIA-492CAAB-2005, Detail Specification for Class IVa Dispersion-Unshifted Single-mode Optical Fibers With Low Water Peak)
    - b) Indoor cable shall have a sheath color of yellow
    - c) Armored cables shall be used.

- d) Acceptable manufacturers (who shall also provide the Advanced System Warranty):
  - 1) Corning
  - 2) Hitachi
  - 3) Mohawk
  - 4) Systimax
- F. Multi-mode Fiber
  - 1. Multimode cable shall:
    - a) Meet OM4 fiber requirements (TIA-492AAAD, Detail Specification for 850- $\mu$ m Laser-Optimized, 50- $\mu$ m Core Diameter/125- $\mu$ m Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers Suitable for Manufacturing OM4 Cabled Optical Fiber)
    - b) Indoor cable shall have a sheath color of aqua.
    - c) Fibers shall be pre-terminated with MTP connectors (12-fibers per MTP connector) on each end of the fiber cable.
    - d) Method "B" shall be used for installation and maintaining optical fiber polarity (see ANSI/TIA-568-C.0).
    - e) Meet the environmental requirements for the area into which it is placed. For example, cabling placed in plenum space shall be listed as OFNP.
    - f) Armored cables shall be used.
    - g) Acceptable manufacturers (who shall also provide the Advanced System Warranty):
      - 1) Corning
      - 2) Hitachi
      - 3) Mohawk
      - 4) Systimax

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Provide all labor, materials, tools and equipment required for the complete and proper installation of backbone optical fiber cabling.
- B. In order to conform to the overall project event schedule, the contractor shall survey and coordinate the backbone optical fiber cabling installation with other applicable trades.
- C. All backbone optical fiber cabling shall be installed point-to-point (e.g., equipment room to telecommunications room) without splice points other than a fusion splice of the single-mode pigtaileds
- D. Each cable type shall be terminated in its own 4U high fiber distribution unit (FDU). A maximum of 144 fibers per 4U FDU shall be permissible. For example, up to 144 50/125 $\mu$ m (OM4) fibers shall terminate in its own FDU per telecommunications room.
- E. Single-mode (OS2) cabling shall be used.

1. Fusion splice pigtails (LC/APC) shall be used for terminating the cable and inserted in LC/APC single-mode adapters.
  2. Polarity shall be maintained using consecutive-fiber positioning (see ANSI/TIA-568-C.0)
- F. Multi-mode (OM4) cabling shall be used.
1. Multi-mode (OM4) cable shall be ordered pre-terminated with 12-fiber MTP connectors on each end. The MTP connectors shall plug into transitions (cassettes) having LC/UPC connectors on the front of the FDU.
  2. Polarity shall be maintained using Method B for array connectors (see ANSI/TIA-568-C.0).
- G. Follow all manufacturers' instructions.
- H. Coordinate with all other trades prior to installation.

**END OF SECTION**