SECTION 27 08 23
TESTING OF FIBER OPTIC CABLES

PART 1 – GENERAL

1.01 DESCRIPTION

A. The work covered by this section of the Specifications includes all labor necessary to perform and complete such construction, all materials and equipment incorporated or to be incorporated in such construction and all services, facilities, tools and equipment necessary or used to perform and complete such construction. The work of this section shall include, but is not limited to, the following:

1. Cable testing for fiber optic cables.

2. Providing testing results in accordance with the strictest manufacturer written recommendations.

1.02 QUALITY ASSURANCE

A. Refer to Section 27 00 00 for general details.

1.03 CODES, STANDARDS AND GUIDELINES

A. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations in Section 17010

1.04 SUBMITTALS

A. Refer to Section 27 00 00 for general details.

B. Shop Drawings:

1. None Required

C. Submit Manufacturer’s Cut Sheets for the following:

1. Any products not specifically listed in the PRODUCTS section shall require a submittal of the manufacturer’s cut sheets.

D. List of test equipment to be used.

E. Sample of test data to be provided to the campus representative at the completion of testing.

D. Identity and qualifications of Contractor's personnel who will perform the testing.

E. Submit the proposed schedule for performing testing at least 2 weeks prior to the start of testing.

1.05 IDENTIFICATION
A. Refer to Section 27 05 53 for general details.

1.06 DEFINITIONS

A. N/A

1.07 WARRANTY

A. Refer to Section 27 00 00 for general details.
PART 2 – PRODUCTS

2.01 OPTICAL TIME DOMAIN REFLECTOMETER (OTDR)

   A. The field tester must meet the requirements of tests specified in ANSI/TIA/EIA-455, inclusive of all subsections.

   B. Make and model at Contractor’s discretion.

2.02 OPTICAL POWER MEASUREMENT EQUIPMENT

   A. Fluke Networks

      1. SimpliFiber

      2. OMNIScanner w/ Fiber Test Adapters

   B. Other Pre-Approved Power Meter

2.03 OPTICAL FIBER INSPECTION SCOPE

   A. Fluke Networks

      1. Fiber Inspector Pro

   B. Other Pre-Approved Inspection Scope
PART 3 – EXECUTION

3.01 GENERAL

A. The Contractor shall test, as described below, all fiber optic cables installed under these specifications.
B. Visually inspect all cables, cable reels, and shipping cartons to detect cable damage incurred during shipping and transport. Return visibly damaged items to the manufacturer.
C. Where post-manufacturer test data has been provided by the manufacturer on the reel or shipping carton: submit copies to the campus representative prior to installing cables.
D. Test fully completed systems only. Piecemeal testing is not acceptable.
E. Testing shall not be performed until after all hardware is installed and attached, and all labeling and identification has been completed.
F. Any cable that does not pass all required testing shall be removed, replaced, and retested.
G. Remove and replace any defective cables from pathways system. Do not abandon cables in place.
H. The campus telecommunications representative reserves the right to observe all portions of the testing process.
I. The campus telecommunications representative further reserves the right to conduct “Proof of performance testing”, using Contractor equipment and labor, a random re-test of up to ten percent (10%) of the cable plant to confirm documented test results.
J. Perform all tests as required by the manufacturer in support of the structured cabling system warranty.

3.02 QUANTITIES

A. N/A

3.03 INSTALLATION

A. N/A

3.04 GROUNDING & BONDING

A. N/A

3.05 TESTING

A. All test results are to be defined as acceptable / unacceptable by the requirements of ANSI/TIA/EIA-526, inclusive of all subsections.
B. Fiber Optic Cables – General Requirements
   1. Index matching fluids or gels shall not be used.
2. Strands whose measured attenuation fall outside the acceptable range shall be subject to further inspection and testing to determine the nature of the fault. Faults related to connectorization shall be corrected, and the fiber re-tested as described above, until acceptable attenuation measurements are recorded. If acceptable attenuation cannot be achieved, than the fiber shall be replaced in its entirety.

C. Optical Time Domain Reflectometer Testing

1. All OTDR testing procedures and field test instruments shall comply with applicable requirements of: EIA/TIA 455-78 and EIA/TIA 455-133
2. OTDR test jumpers must meet the criteria for reference jumpers specified in EIA/TIA-455-171.
3. A launch cable shall be installed between the OTDR and the first link connection.
4. A receive cable shall be installed after the last link connection.
5. All cables shall be OTDR tested at 1310 nm and 1550 nm (for Single-mode) operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss.
6. All cables shall be OTDR tested at 850 nm and 1300 nm (for Multi-mode) operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss.
7. All fiber links shall be tested in both directions.
8. Optical Return Loss (ORL) for each link shall be measured.
9. Fiber Length shall be measured and documented.
10. Perform a high resolution OTDR test with tracing printouts noting each optical fiber and buffer tube color designation.

D. Optical Power Loss Testing

1. All fiber optic cables are to be tested via the One-Jumper Reference Method, formerly Method B.
2. Perform end-to-end, bi-directional attenuation (loss) test for each fiber strand at 850nm and 1300nm (multi-mode) or at 1310 and 1550 (single mode) wavelengths.

E. Other Tests

1. After installation of connectors, visually inspect each fiber end-face at 200x magnification for multi mode fiber and 400x magnification for single mode fiber. Refinish fibers with visible defects and/or striations in the core area.

3.06 ACCEPTANCE

A. All test results and corrective procedures are to be documented and submitted in Microsoft Excel or CSV format to the campus telecommunications representative within five (5) working days of test completion.

B. Each test report shall contain the following general information:
1. Date of Preparation
2. Date of Test
3. Project Name
4. Contractor’s Name
5. Media Type
6. Make, Model and Serial Number of test equipment used
7. Date of Last Calibration
8. Names of Test Crew.

C. Submit the following information regarding the optical fiber cable testing:
   1. Cable Number
   2. Fiber Count
   3. Individual Fiber Numbers
   4. Connector Types
   5. Number of Connectors / Patches
   6. Calculated Maximum Link Loss
   7. Length of Run
   8. Results of Each Test for Each Fiber

D. Test result shall be recorded per cable and identical copies placed on three removable media devices (CD or DVD) for delivery to the campus project manager and campus telecommunications representative.

E. Once the testing has been completed and the campus telecommunications representative is satisfied that all work is in accordance with the Contract Documents, the representative will notify the Contractor and/or campus project manager in writing or via email.

3.07 RECORD (ASBUILT) DRAWINGS

A. None Required

END OF SECTION
**DOCUMENT VERSION CONTROL**

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