

1.0 **GENERAL**

1.1 **DOCUMENTS**

- .1 This section of the Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.2 **SUMMARY**

- .1 Section Includes:
 - 1.0 GENERAL
 - 1.1 DOCUMENTS
 - 1.2 SUMMARY
 - 1.3 OVERVIEW
 - 1.4 WORK INCLUDED
 - 1.5 FIBRE QUALITY ASSURANCE
 - 1.6 FIBRE TESTING SCOPE
 - 1.7 TESTING OPTICAL FIBRE CABLE
 - 1.8 OPTICAL LOSS TESTING
 - 1.9 COPPER TESTING SCOPE
 - 1.10 TESTING CAT 6 INSTALLATION
 - 1.11 OPTIONAL REQUIREMENTS

1.3 **OVERVIEW**

- .1 The Contractor shall allow in the Tender for the presence of qualified test Personnel for all testing.
- .2 Test equipment shall be approved by the UBCO Information Technology Representative in writing before it can be used to test the structured cabling systems.
- .3 Final details of all test parameters, scope, and methodology to be performed by the Contractor, as described in this Testing Section, shall be verified with the UBCO Information Technology Representative.
- .4 All terminations shall be completed and all Communications equipment installed before the tests are performed.
- .5 The UBCO Information Technology Representative shall determine at time of testing, and which terminations shall be included in the performance test.
- .6 UBC Information Technology reserves the right to monitor the testing process as it happens.
- .7 The UBC Information Technology Representative reserves the right to verify the Contractors' test results. In case of a discrepancy between the UBC Information Technology Representative's test results and the Contractor's test reports, then UBC Information Technology Representative's test results shall be considered accurate. In this instance, the Contractor shall correct any deficiencies at no cost to UBC.

1.4 WORK INCLUDED

- .1 Provide all labour, materials, tools, field-test instruments and equipment required for the complete testing, identification and administration of the work called for in the Contract Documents.
- .2 In order to conform to the overall project event schedule, the cabling contractor shall monitor work progress and coordinate cable testing with other applicable trades.
- .3 In addition to the tests detailed in this document, the contractor shall notify the-UBC Information Technology Representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional test results at no additional charge.

1.5 FIBRE QUALITY ASSURANCE

- .1 All testing procedures and field-test instruments shall comply with applicable requirements of:
 - .1 All applicable ANSI TIA/EIA standards for safe use and testing of Fibre Systems
 - .2 Trained technicians who have successfully attended an appropriate training program, which includes testing with an OLTS and an OTDR and have obtained a certificate as proof thereof shall be allowed to execute the tests. These must be issued by any of the following organizations or an equivalent organization:
 - .1 Manufacturer of the Fibre optic cable and/or the Fibre optic connectors.
 - .2 Manufacturer of the test equipment used for the field certification.
 - .3 Training organizations (e.g., BICSI)
- .3 A UBCO Information Technology Representative shall be invited to witness and/or review field-testing.
 - .1 A UBCO Information Technology Representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
 - .2 The UBCO Information Technology Representative will select and test a random sample of 5% of the installed links. The results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the data provided by the installation Contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the Installation Contractor under supervision of the UBC Information Technology Representative shall repeat 100% testing at no cost to the UBC.

1.6 FIBRE TESTING SCOPE

- .1 Initially test every strand within the fibre optic cable with a light source and power-meter utilizing procedures as stated in current ANSI/TIA/EIA standards. Measured results shall be within manufacturers' loss budget calculations. If loss figures are outside this range, test cable with optical time domain reflectometer to determine cause of variation. Correct improper splices and replace damaged cables or connectors at no cost to UBC Information Technology.

- .2 All tests performed on optical fibre cabling that use a laser or LED in a test set shall be carried out with safety precautions in accordance with current ANSI standards.
- .3 All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work. The following test parameters shall be adhered to:
 - .1 Single mode fibre optic cables shall be tested at 1300 nm and 1550 nm.
 - .2 Testing procedures shall utilize "Method 1" – one jumper reference.
 - .3 Bi-directional testing of optical Fibres is required.
 - .4 Submit all fibre optic test results in electronic format for all fibre optic strand tests performed, in addition to the required hard copy.

1.7 **TESTING OPTICAL FIBRE CABLE**

- .1 Field-test instruments shall have the latest software and firmware installed.
- .2 Link and channel test results from the OLTS and OTDR shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative (reports) may be generated.
- .3 If required, fibre end faces shall be optically inspected at 250X magnification. Scratched, pitted or dirty connectors shall be diagnosed and replaced at no cost to UBC.
- .4 End face images shall be provided electronically.
- .5 Testing shall be performed on each cabling segment (connector to connector).
- .6 Testing shall be performed on each cabling channel (equipment to equipment) that is planned for use as per Information Technology' instructions.
- .7 Testing of the cabling shall be performed using high-quality test cords of the same Fibre type as the cabling under test. The test cords for OLTS testing shall be between 1 m and 5 M length. The test cords for OTDR testing shall be at least 100 meters for the launch cable and at least 25 meters for the receive cable.

1.8 **OPTICAL LOSS TESTING**

- .1 **Backbone Link**
 - .1 Single mode backbone links shall be tested at 1300 nm and 1550 nm in accordance with ANSI/EIA/TIA-526-14A, Method 1, One Reference Jumper or the equivalent method.
 - .2 Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.
 - .3 Use the One Reference Jumper Method specified by current ANSI/TIA/EIA standards or an equivalent method. The user shall follow the procedures established by these standards or application notes to accurately conduct performance testing.

- .2 Horizontal single mode link
 - .1 The horizontal optical Fibre cabling link segments need to be tested at only one wavelength. The horizontal link should be tested at 1300 nm or 1550 nm bi-directional in accordance with current ANSI/EIA/TIA standards or the equivalent method.
- .3 Centralized single mode link
 - .1 The centralized optical Fibre cabling link segments need to be tested at only one wavelength. The centralized link should be tested at 1300 nm or 1550 nm bi-directional in accordance with current ANSI/EIA/TIA standards or the equivalent method.

1.9 COPPER TESTING SCOPE

- .1 Category 3 Intra and Inter backbone cable testing shall consist of testing each cable pair for opens, shorts, grounds and pair reversal. Only a 100% pair pass rate will be accepted.
- .2 Random testing on all cabling mediums shall be done by the UBCO Information Technology Representative. Where any portion of the system does not meet testing specifications, the Contractor shall correct the deviation and repeat all applicable testing at no additional cost to the Information Technology.
- .3 The following items shall be submitted to UBCO Information Technology Representative upon completion of testing the installed cables:
 - 1. Supply a complete set of UTP/STP test results in electronic format.

1.10 TESTING CATEGORY 6A INSTALLATION

- .1 Category 6A UTP/STP testing shall conform to current ANSI/ TIA/EIA - T568-C standard. Testing shall be accomplished using a Fluke DSX 8000 or newer Fluke Digital Cable Analyzer field tester with appropriate permanent link adapters. Permanent link testing procedures shall be used to certify the system. **NO SUBSTITUTE TESTERS WILL BE ALLOWED.**
- .2 All links must attain a "PASS" certification, unless otherwise released from this requirement by the UBCO Information Technology Representative.
- .3 Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall be allowed to execute the tests. Appropriate training programs are limited to installation certification programs provided by BICSI and its authorized training partners, the Association of Cabling Professionals (ACP) and recognized cabling manufacturers in the industry.
- .4 The tester shall be within the calibration period recommended by the tester manufacturer in order to achieve the vendor-specified measurement accuracy and be acceptable to UBCO Information Technology.
- .5 All FTP Category 6A cable test results must show continuity of shield from end to end.

1.11 OPTIONAL REQUIREMENTS

- .1 A representative of the end-user shall be invited to witness field testing. The representative shall be notified of the start date of the testing phase 5 business days before testing commences.
- .2 A UBCO Information Technology Representative will select a random sample of 5% of the installed links for testing and storing the results in accordance with the prescriptions in the current TIA/EIA Standard. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of UBCO Information Technology Representative shall repeat 100% testing at no cost to UBC.

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