

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 – Common Work Results for Electrical.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA-C22.2 No. 214-02, Communications Cables (Bi-National standard with UL 444).
  - .2 CSA-C22.2 No. 232-M1988(R2004), Optical Fiber Cables.
- .2 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)
  - .1 TIA/EIA-568-B.1-(2001), Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
  - .2 TIA/EIA-568-B.2-(2001), Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
  - .3 TIA/EIA-568-B.3-(2000), Optical Fiber Cabling Components Standard.
  - .4 TIA/EIA-606-A-(2002), Administration Standard for the Commercial Telecommunications Infrastructure.
  - .5 TIA TSB-140-2004, Telecommunications Systems Bulletin - Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.
  - .6 TIA-598-C-(2005), Optical Fiber Cable Color Coding.

**1.3 DEFINITIONS**

- .1 Refer to TIA/EIA-598-C, Annex A for definitions of terms: optical-fiber interconnect, distribution, and breakout cables.

**1.4 SYSTEM DESCRIPTION**

- .1 Structured telecommunications wiring system consist of unshielded-twisted-pair and optical fiber cables, terminations, connectors, cross-connection hardware and related equipment installed inside building for occupant's telecommunications systems, including voice (telephone) and data.
- .2 Installed in physical star configuration with separate horizontal and backbone sub-systems.

**1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 As-built Records and Drawings:
  - .1 Provide electronic drawings depicting all construction.
  - .2 Provide two (2) bound complete hard-copy sets of as-built records to the Departmental Representative.

- .1 Provide and place one hard copy of as-built records for each telecommunications room in plan holder in each telecommunications room.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Conduit: PVC to Section 26 05 34 – Conduits, Conduit fastenings and Conduit Fittings.
- .2 Outlet boxes, conduit boxes and fittings: to Section 26 05 32
- .3 All Permanent Link components shall be from the same manufacturer.

### **2.2 FOUR-PAIR 100 $\Omega$ BALANCED TWISTED PAIR CABLE**

- .1 Four-pair, 100 ohm balanced unshielded-twisted-pair (UTP) cable, flame test classification FT6 to: CSA-C22.2 No. 214, Category 6 (Cat 6) to: TIA/EIA-568-B.2. Color to be decided by owner.

### **2.3 WORK AREA UTP 4-PAIR MODULAR JACK**

- .1 Eight-position modular jack ("RJ-45"), type T568A, Category 6 to: TIA/EIA-568- B.2:
  - .1 In self-contained surface-mount box, two jacks per box. Acceptable in electrical and mechanical rooms only.
  - .2 Mounted in compatible single gang faceplate, angle entry, four jack positions per faceplate, white finish.

### **2.4 TERMINATION AND CROSS-CONNECTION HARDWARE FOR UTP**

- .1 MDVO patch panel, one rack unit high, 24 ports:
  - .1 Each port equipped with field installed "RJ-45" jacks, type T568A Category 6 to: TIA/EIA-568-B.2. Confirm modular RJ45 jacks color with owner.
  - .2 Supply CAT. 6 MDVO connectors as required to terminate all incoming cabling with 25% spare modules. Color to be determined by owner.
  - .3 Horizontal cable-management unit for every patch panel.

### **2.5 UTP PATCH CORDS**

- .1 factory-installed male plug at one end to mate with "RJ-45" jack and with factory-installed male plug at other end to mate with "RJ-45" jack Category 6, 4 pairs to: TIA/EIA-568-B.2. 1.5m in length. Color to be decided by owner.

### **2.6 UTP WORK AREA CORDS**

- .1 end equipped with "RJ-45" plug Category 6 to: TIA/EIA-568-B.2. 3.0m in length. Color to be decided by owner.

## **2.7 OUTDOOR OPTICAL FIBER CABLE**

- .1 Indoor/outdoor rated distribution cable, multi-mode OM3 50/125 micron, laser optimized, 6 strands to: TIA/EIA-568-B.3, flame test classification FT6, each end terminated with duplex LC connectors.

## **2.8 INDOOR OPTICAL FIBER CABLE**

- .1 Interconnect cable, multi-mode OM3 50/125 micron, laser optimized, 2 strands to: TIA/EIA-568-B.3, flame test classification FT6, each end terminated with duplex LC connectors. Used for fire alarm class A loop from data rack to fire alarm control panel/node.
- .2 All cabling shall be by the same manufacturer.

## **2.9 OPTICAL-FIBER PATCH PANEL**

- .1 Mounted in rack, 482mm wide, 762mm depth, with lockable cover, equipped with duplex LC compatible adapters, capable of terminating 6 pairs of fiber.
- .2 All cabling shall be by the same manufacturer.

## **2.10 OPTICAL-FIBER PATCH CORDS**

- .1 Interconnect cable, 2 strand, 1 metre long, each end equipped with duplex LC connectors. Multi-Mode 50/125 micron, laser optimized to: TIA/EIA-568-B.3.

## **2.11 TELEPHONE BIX MOUNTS**

- .1 250 pair bix mounts, cable management rings, with 25 pair IDC connector strips to: TIA 568.C.2.

## **2.12 WALL MOUNTED DATA RACK**

- .1 EIA compliant 482mm cabling wall mounted rack. 660mm W x 660mm D, with 610mm useable depth, 18 rack units, 200 lbs weight capacity, with the following options
  - .1 Six D rings
  - .2 Top fan kit
  - .3 Vertical and horizontal cable managers as indicated on drawings
  - .4 Bonding kit
  - .5 9 outlet, 15A, horizontal power distribution with surge protection
  - .6 1000VA UPS

## **2.13 BACKBONE CABLE (VOICE)**

- .1 25 unshielded-twisted-pair (UTP) cable placed into a cable core, 24 AWG solid copper, flame test classification FT6 to: CSA-C22.2 No. 214, Category 6 (Cat 6).

**Part 3 Execution**

**3.1 INSTALLATION OF TERMINATION AND CROSS-CONNECT HARDWARE**

- .1 Install termination and cross-connect hardware in cabinet as indicated and according to manufacturers' instructions. Identify and label as indicated to: TIA/EIA-606-A.

**3.2 INSTALLATION OF HORIZONTAL DISTRIBUTION CABLES**

- .1 Install horizontal cables as indicated in conduits from telecommunication rooms to individual work-area jacks. Identify and label as indicated to: TIA/EIA-606-A.
- .2 Coil spare cables and store in ceiling space in zone.
- .3 Harness slack cable in cabinets, racks, and wall-mounted termination and cross-connection hardware.

**3.3 INSTALLATION OF BACKBONE CABLES**

- .1 Install backbone cables from each telecommunications room to main terminal/equipment room (MT/ER) as indicated and according to manufacturers' instructions.
  - .1 Identify and label as indicated to: TIA/EIA-606-A.
- .2 Install backbone cables from MT/ER to carrier demarcation point as indicated and according to manufacturer's instructions.
  - .1 Identify and label as indicated to: TIA/EIA-606-A.

**3.4 INSTALLATION OF EQUIPMENT CABLES**

- .1 Install equipment cables from equipment patch panel as indicated.
  - .1 Identify and label as indicated to: TIA/EIA-606-A.

**3.5 IMPLEMENT CROSS-CONNECTIONS**

- .1 Implement cross-connections using patch cords as specified.

**3.6 FIELD QUALITY CONTROL**

- .1 Test horizontal UTP cables as specified below and correct deficiencies provide record of results as electronic record.
  - .1 Perform tests for Permanent Link on installed cables, including spares:
    - .1 Category 6 using certified level III tester to: TIA/EIA-568-B.2.
  - .2 Perform tests for Channel on all of cross-connected data horizontal cabling installed from each telecommunications room, including shortest and longest drops from each telecommunications room:
    - .1 Category 6 using certified level III tester to: TIA/EIA-568-B.2.
- .2 Test backbone UTP cables as specified below and correct deficiencies: provide record of results as electronic record.

- .1 Perform tests for Permanent Link on 4-pair cables:
  - .1 Category 6 using certified level III tester to: TIA/EIA-568-B.2.
- .2 Perform Wire Map tests on multi-pair UTP cables to: TIA/EIA-568-B.1.
- .3 Test Optical-fiber strands for attenuation to: TIA/EIA-568-B.1 and correct deficiencies: provide record of results as electronic record.
  - .1 Test horizontal links need at only one wavelength (850 nm or 1300 nm) and in one direction.
    - .1 Attenuation to be less than 2.0 dB, unless consolidation point is used.
    - .2 If consolidation point is used, attenuation test result to be less than 2.75 dB when testing between horizontal cross-connect and telecommunications outlet/connector.
  - .2 Test backbone links in both directions. Backbone links:
    - .1 Test multi-mode fiber at both applicable wavelengths (850 nm and 1300 nm).
    - .2 Test single-mode fiber at both applicable wavelengths (1550 nm and 1310 nm).
  - .3 Maximum attenuation: Cable attenuation + Connector loss + Splice loss.
    - .1 Multi-mode-fiber attenuation coefficients:
      - .1 3.5 db/km @ 850 nm; and
      - .2 1.5 db km @ 1300 nm
    - .2 Single-mode fiber attenuation coefficients at both 1310 nm and 1550 nm:
      - .1 1.0 db/km for inside plant cable; and
      - .2 0.5 db/km for outside plant cables.
    - .3 Maximum connector insertion loss: 0.75 db per pair and maximum splice insertion loss: 0.3 db.
- .4 Perform additional Tier 2 tests using optical time domain reflectometer (OTDR) on backbone fiber pairs to: TSB-140.
  - .1 Correct deficiencies.
  - .2 Provide record of results as described in SUBMITTALS.
- .5 Provide record of results as electronic record to: TIA/TSB-140.

**END OF SECTION**