

## **Part 1        General**

### **1.1            REFERENCES**

- .1        Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA)
  - .1        TIA/EIA-606B, Administration Standard for the Commercial Telecommunications Infrastructure.
  - .2        TIA-607-B - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- .2        U.S. Department of Labor/Occupational Safety and Health Administration (OSHA)
  - .1        Nationally Recognized Testing Laboratory (NRTL).

### **1.2            SYSTEM DESCRIPTION**

- .1        Telecommunications grounding and bonding system consist of grounding busbars, bonding backbones, and other bonding conductors.
- .2        Provides ground reference for telecommunications systems within building and bonding to it of telecommunications rooms.
- .3        Metallic pathways, cable shields, conductors, and hardware within telecommunications spaces are bonded to telecommunications grounding and bonding system.

### **1.3            QUALITY ASSURANCE**

- .1        Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

## **Part 2        Products**

### **2.1            TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)**

- .1        Predrilled copper busbar, approved by NRTL, electrotin plated with holes 8 mm diameter for use with standard-sized lugs to: TIA-607-B.
- .2        Dimensions 6 mm thick, 100 mm wide, 500 mm long to: TIA-607-B.

### **2.2            BONDING CONDUCTOR FOR TELECOMMUNICATIONS**

- .1        3/0 AWG copper conductor, green marked to: TIA-607-B.

### **2.3            TELECOMMUNICATIONS BONDING BACKBONE (TBB)**

- .1        3/0 AWG copper conductor, green marked to: TIA-607-B.

### **2.4            WARNING LABELS**

- .1        Non-metallic warning labels in English and French to: TIA-607-B.
- .2        Identify labels with wording "If this connector is loose or must be removed, please call the building telecommunications manager".

**Part 3 Execution**

**3.1 TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)**

- .1 Install TMGB in room 104 IT Closet on insulated supports 50 mm high at location close to electrical power panel if one is installed in same room as indicated.
- .2 Install #3/0 AWG copper bonding conductor from TMGB to alternating current equipment ground (ACEG) of serving electrical power panel (panelboard).

**3.2 BONDING CONDUCTORS GENERAL**

- .1 When placed in ferrous metallic conduit or EMT longer than 1 m, bond to each end of conduit or EMT using #6 AWG copper conductor.

**3.3 BONDING CONDUCTOR FOR TELECOMMUNICATIONS**

- .1 Install bonding conductor for telecommunications from TMGB to service equipment (power) ground.
- .2 Use exothermic welding, approved 2 hole compression lugs for connection to TMGB.

**3.4 TELECOMMUNICATIONS BONDING BACKBONE (TBB)**

- .1 Install TBB from TMGB to each TGB as indicated.
- .2 Use exothermic welding, approved 2 hole compression lugs for connection to TMGB and TGBs.

**3.5 BONDING TO TMGB**

- .1 Bond metallic raceways in room 104 IT Closet to TMGB using #6 AWG green insulated copper conductor.
- .2 For cables within Room 104 IT Closet having shield or metallic member, bond shield or metallic member to TMGB using #6 AWG green insulated copper conductor.
- .3 Bond equipment rack located in Room 104 IT Closet to TMGB using #6 AWG green insulated copper conductor.

**3.6 LABELLING**

- .1 Apply warning labels to telecommunications bonding and grounding conductors.
- .2 Apply additional administrative labels to: TIA/EIA-606B.

**END OF SECTION**

## **Part 1 General**

### **1.1 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA-C22.2 No. 214, Communications Cables (Bi-National standard with UL 444).
  - .2 CSA-C22.2 No. 232, Optical Fiber Cables.
- .2 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)
  - .1 TIA/EIA-568-C.1, Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
  - .2 TIA/EIA-568-C.2, Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
  - .3 TIA/EIA-568-C.3, Optical Fiber Cabling Components Standard.
  - .4 TIA/EIA-606-B, Administration Standard for the Commercial Telecommunications Infrastructure.
  - .5 TIA-607 (latest revision) – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
  - .6 TIA TSB-140-2004, Telecommunications Systems Bulletin - Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.
  - .7 TIA-598-C, Optical Fiber Cable Color Coding.

### **1.2 DEFINITIONS**

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

### **1.3 SYSTEM DESCRIPTION**

- .1 Structured telecommunications wiring system consist of unshielded-twisted-pair cables, terminations, connectors, cross-connection hardware, communications racks 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 Horizontal cables link work areas to telecommunications rooms located on same floor.
  - .2 Telecommunications rooms linked to main terminal/equipment room (MT/ER) by backbone cables.
  - .3 MT/ER also linked to Entrance Room by backbone cables.

### **1.4 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 As-built Records and Drawings:

- .1 Provide Microsoft Access database reflecting cable installation and cross-connections.
- .2 Provide electronic drawings in AutoCAD .dwg format depicting all construction.
- .3 Provide two (2) bound complete hard-copy sets of as-built records to the Contract Administrator.
  - .1 Provide and place one hard copy of as-built records for each telecommunications room in plan holder in each telecommunications room.

## **1.5 QUALITY ASSURANCE**

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **Part 2 Products**

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

- .1 Four-pair, 100 ohm balanced unshielded-twisted-pair (UTP) cable, flame test classification FT6 or MPP or CMP to: CSA-C22.2 No. 214, Category 6 (Cat 6) to: TIA/EIA-568-C.2.

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

- .1 100 ohm, pairs as indicated, sheath consists of thermoplastic jacket with underlying metallic shield, Category 5 to: TIA/EIA-568-C.2, flame test classification FT6 or MPP to: CSA-C22.2 No. 214.

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

- .1 Eight-position modular jack ("RJ-45"), type T568A Category 6 to: TIA/EIA-568-C.2:
  - .1 In self-contained surface-mount box, 2 jacks per box unless otherwise indicated.
  - .2 Mounted in compatible single gang faceplate, flush entry, 3 jack positions per faceplate unless otherwise indicated.
  - .3 Provide blank inserts for any unused ports

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

- .1 IDC Terminal strips, 25 pair, for terminating multi-pair 100  $\Omega$  balanced twisted pair cables and supporting cross-connections using jumper wires or compatible plug-ended patch cords: Category 6 to: TIA/EIA-568-C.2.
- .2 Mount or block for housing 10 IDC terminal strips, mounted on wall, rack or cabinet as indicated.
  - .1 Distribution rings or channels capable of externally mating with the above mount for managing cross-connection wires.

- .3 Patch panel, 2 rack units high, modular port 24 or 48 port configuration:
  - .1 Each port equipped with field installed "RJ-45" jacks, type T568A Category 6 to: TIA/EIA-568-C.2.
  - .2 Horizontal cable-management unit for every 48 ports.

## **2.5 UTP CROSS-CONNECT WIRE**

- .1 Category 5, multi- pairs to: TIA/EIA-568-C.2.

## **2.6 UTP PATCH CORDS**

- .1 2.0 meters long, with 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-C.2.

## **2.7 UTP EQUIPMENT CABLE**

- .1 4 pair "cable", 2.0 meters long, with factory-installed male plug on one end to mate with "RJ-45" jack and other end equipped with factory-installed male plug to mate with terminal strip Category 6 to: TIA/EIA-568-C.2.

## **2.8 COMMUNICATIONS RACKS/CABINETS**

- .1 Wall mounted 19", open frame rack, minimum eight (8) rack units, horizontally mounted power strip/bar with 6 receptacles.

## **2.9 CONDUIT SYSTEMS**

- .1 Install conduit systems and pull boxes for data wiring including:
  - .1 Vertical stubs in walls from outlets into accessible ceiling space.
  - .2 Zone conduits for collection of UTP wiring in ceiling spaces.
  - .3 Pull boxes.

## **Part 3 Execution**

### **3.1 GENERAL INSTALLATION**

- .1 Ensure that manufacturer's bending radius limitations are adhered to.
- .2 Protect all cables from damage during installation.
- .3 Provide insulated conduit bushing at open end of wall stub-up.
- .4 Turn over UTP patch cords to Contract Administrator.

### **3.2 INSTALLATION OF TERMINATION AND CROSS-CONNECT HARDWARE**

- .1 Install termination and cross-connect hardware on wall, in rack, or in cabinet as indicated and according to manufacturers' instructions. Identify and label as indicated to: TIA/EIA-606-B.

### **3.3 INSTALLATION OF HORIZONTAL DISTRIBUTION CABLES**

- .1 Install horizontal cables as indicated in conduits, cable trays, perimeter raceways, "J" hooks from telecommunication rooms to individual work-area jacks. Identify and label as indicated to: TIA/EIA-606-B.
- .2 Support horizontal cables at intervals not exceeding 2 meters.
  - .1 Where raceways are used to distribute cables to each zone, provide supplementary "J" hooks to support cables at intervals not exceeding 2 meters.
- .3 Terminate horizontal cables in telecommunications room and at individual work-area jacks.
  - .1 Identify and label as indicated to: TIA/EIA-606-B.
- .4 Coil spare cables and store in ceiling space in zone.
- .5 Harness slack cable in cabinets, racks, and wall-mounted termination and cross-connection hardware.

### **3.4 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-B.
- .2 Install backbone cables from MT/ER to carrier demarcation point in Entrance Room as indicated and according to manufacturer's instructions.
  - .1 Identify and label as indicated to: TIA/EIA-606-B.

### **3.5 IMPLEMENT CROSS-CONNECTIONS**

- .1 Implement cross-connections using patch cords as specified.
- .2 Implement cross-connections using jumper wires as specified.

### **3.6 FIELD QUALITY CONTROL**

- .1 Test horizontal UTP cables as specified below and correct deficiencies provide record of results as hard copy and electronic record on CD.
  - .1 Perform tests for Permanent Link on installed cables, including spares:
    - .1 Category 6 using certified level IV tester to: TIA/EIA-568-C.2.
  - .2 Perform tests for Channel on 20% of cross-connected data horizontal cabling installed from each telecommunications room, including shortest and longest drops from each telecommunications room: should more than 5% of tested cables fail, test remaining cross-connected data cables.
    - .1 Category 6 using certified level IV tester to: TIA/EIA-568-C.2.
- .2 Test backbone UTP cables as specified below and correct deficiencies: provide record of results as hard copy and electronic record on CD.
  - .1 Perform tests for Permanent Link on 4-pair cables:
    - .1 Category 6 using certified level IV tester to: TIA/EIA-568-C.2.
  - .2 Perform Wire Map tests on multi-pair UTP cables to: TIA/EIA-568-C.1.

- .3 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.
- .4 Provide record of results as hard copy and electronic record on CD to: TIA/TSB-140.
- .5 No conditional PASS or FAIL results shall be accepted.
- .6 Replace cable and/or connection equipment that fails tests.

### **3.7 INSTALLATION OF RACKS/CABINETS**

- .1 Install racks/cabinets as per manufacturer's recommendations.
- .2 Provide grounding and bonding of racks/cabinets to: TIA-607.

### **3.8 CONDUIT SYSTEM**

- .1 Do not provide conduit raceways that exceed 30 m or contain more than two 90<sup>0</sup> bends (or equivalent in accordance with B7) between pull points or pull boxes.
- .2 Do not provide pull boxes in lieu of conduit bends.
- .3 LB connectors not permitted.
- .4 Provide inside radius bends to a minimum of 6 times the internal diameter for conduits 50 mm and smaller. For larger conduits provide inside radius bends to a minimum of 10 times the internal diameter of the conduit.
- .5 Ensure conduits terminations are free from sharp edges and fitted with insulated bushings.
- .6 Ream individual lengths of conduit to remove sharp edges.

**END OF SECTION**