

## **PART 1 – GENERAL**

### **1.1 RELATED WORK**

- .1 Section 26 05 00 – Common Work Results for Electrical.
- .2 Section 26 05 21 – Wires and Cables (0 – 1000 V).
- .3 Section 26 05 28 – Grounding – Secondary.
- .4 Section 27 05 28 – Pathways for Communications Systems.

### **1.2 REFERENCE STANDARDS**

- .1 American National Standards Institute (ANSI)/Telecommunications Industry Association (TIA)
  - .1 ANSI/TIA-606-C (2017), Administration Standard for Telecommunications Infrastructure.
- .2 Canadian Standards Association (CSA International)
  - .1 C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard with NMX-J-590-ANCE and UL 467).
- .3 Telecommunications Industry Association (TIA)
  - .1 TIA-607-C-1 (2017), Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
- .4 U.S. Department of Labor/Occupational Safety and Health Administration (OSHA)
  - .1 Nationally Recognized Testing Laboratory (NRTL).

### **1.3 SYSTEM DESCRIPTION**

- .1 Metallic pathways, cable shields, conductors, and hardware within telecommunications spaces are bonded to telecommunications grounding and bonding system.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Division 01 – General Requirements.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

### **1.5 QUALITY ASSURANCE**

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 – General Requirements.

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

- .1 Waste Management: separate waste materials for reuse and recycling in accordance with Division 01 – General Requirements.

## **PART 2 – PRODUCTS**

### **2.1 GENERAL**

- .1 Insulated grounding and bonding conductors: green, Type R90, copper conductors, size as indicated, in accordance with Section 26 05 21 – Wires and Cables (0 – 1000 V).

### **2.2 TELECOMMUNICATIONS EQUIPMENT BONDING CONDUCTOR (TEBC)**

- .1 #6 AWG copper conductor, green insulated, marked to: TIA-607-C.
- .2 Pre-terminated with 45 degree bent lug for equipment end and straight lug for busbar end.

### **2.3 BONDING HARDWARE**

- .1 All telecommunications bonding hardware to be stainless steel.
- .2 Each bolt to have a nut, flat washer on both sides and a Belleville washer on the bolt side of the stack up.

### **2.4 WARNING LABELS**

- .1 Non-metallic warning labels in English to: TIA-607-C.
- .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 BONDING GENERAL**

- .1 Bond all metallic communications conduits and sleeves to ground.
- .2 For communications conduit drops remote from telecommunications rooms, install grounding bushings on conduit stub and bond conduit to ground using #6 AWG bare bonding conductor to closest grounded junction or device box. Alternatively #12 AWG green bonding conductor not exceeding 2m in length may be utilized to bond adjacent device boxes where bonding conductor is concealed in wall construction and not subject to physical damage.
- .3 For communications conduit sleeves remote from telecommunications rooms, install grounding bushings on conduit and bond conduit sleeve to ground using #6 AWG bare bonding conductor to closest grounded junction or device box.

### **3.2 LABELLING**

- .1 Apply warning labels to telecommunications bonding and grounding conductors to: TIA-607-C.
- .2 Apply additional administrative labels to: ANSI/TIA-606-C.

**END OF SECTION**

## **PART 1 – GENERAL**

### **1.1 RELATED WORK**

- .1 Section 26 05 00 – Common Work Results for Electrical.
- .2 Section 26 05 31 – Junction and Pull Boxes.
- .3 Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings.
- .4 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.
- .5 Section 27 05 26 – Grounding and Bonding for Communications Systems.

### **1.2 REFERENCE STANDARDS**

- .1 American National Standards Institute (ANSI)/Telecommunications Industry Association (TIA)
  - .1 ANSI/TIA-569-D (2015), Telecommunications Pathways and Spaces.
- .2 Building Industry Consulting Service International (BICSI)
  - .1 Telecommunications Distribution Methods Manual (13<sup>th</sup> Edition).
- .3 Canadian Standards Association (CSA International)
  - .1 C22.1-18, Canadian Electrical Code (CEC), Part 1 (24<sup>th</sup> Edition), Safety Standard for Electrical Installations.
- .4 National Research Council of Canada
  - .1 National Building Code of Canada (NBCC) 2010.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Division 01 – General Requirements.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Division 01 – General Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground, indoors in clean, dry location and in accordance with manufacturer's recommendations.

- .2 Store and protect materials from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Division 01 – General Requirements.

## **PART 2 – PRODUCTS**

### **2.1 SYSTEM DESCRIPTION**

- .1 Pathways for communications systems includes both horizontal distribution pathways as well as vertical components to point of use.
- .2 Communications raceways system consists of outlet boxes, cover plates, conduits, pull boxes, sleeves and caps, fish wires, service poles.
- .3 Overhead J-hook horizontal distribution system.

### **2.2 MATERIAL**

- .1 Conduits: in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .2 Overhead distribution system: J-hooks.
- .3 Junction boxes: in accordance with Section 26 05 31 – Junction and Pull Boxes.
- .4 Outlet boxes, conduit boxes and fittings: in accordance with Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings.
- .5 Fish wire: polypropylene type.
- .6 Cable ties: Velcro.

## **PART 3 – EXECUTION**

### **3.1 INSTALLATION**

- .1 Install raceway system, including overhead distribution system, fish wire, outlet boxes, pull boxes, cover plates, conduit, sleeves and caps, miscellaneous and positioning material to constitute complete system.
- .2 For data/telephone services, install 100 mm x 100 mm device boxes with single gang plaster rings at drop location with conduit to main cable pathway in accessible ceiling space. Use 21 mm conduit for 3 or less outlets and 27 mm conduit for 4 or more outlets.
- .3 Bonding of communications conduits is to be in accordance with Section 27 05 26 – Grounding and Bonding for Communications Systems.
- .4 Main cable pathways to be installed parallel and perpendicular to building lines.

- .5 For main cable pathway, install J-hook supports at 1200 mm maximum spacing in accessible ceiling space. Provide dedicated J-hook support pathways for each communications system.
- .6 Where raceway cable tray is used to distribute cables to each zone, provide supplementary J-hooks as required to support cables at 1200 mm maximum spacing to each work area.
- .7 Dress cabling using Velcro cable ties.
- .8 Where the main cable pathway crosses through bulkheads and inaccessible ceiling spaces, provide dedicated conduit sleeves for cabling for each communications system to bridge the inaccessible space. Provide one spare empty conduit sleeve at each location.
- .9 Conduit sleeves through fire rated partitions must be fire stopped both inside and outside the sleeve with an approved fire stopping system, rated to match the partition.
- .10 Bonding of conduit sleeves is to be in accordance with Section 27 05 26 – Grounding and Bonding for Communications Systems.
- .11 Conduit drops and sleeves to be sized as follows:
  - .1 21 mm C – 3 Category 6 UTP cables maximum.
  - .2 27 mm C – 5 Category 6 UTP cables maximum.
  - .3 35 mm C – 9 Category 6 UTP cables maximum.
  - .4 41 mm C – 12 Category 6 UTP cables maximum.
  - .5 53 mm C – 20 Category 6 UTP cables maximum.
  - .6 63 mm C – 30 Category 6 UTP cables maximum.
  - .7 78 mm C – 40 Category 6 UTP cables maximum.
- .12 Communications cables to be concealed in building construction in all finished areas.
- .13 Install cables in conduit in all inaccessible spaces or where exposed in unfinished areas.
- .14 Install non-FT4 rated cables in conduit.

### **3.2 RESTRICTIONS**

- .1 The use of nylon or plastic cable ties is not permitted.
- .2 Where conduits or ducts are intended for Utility use or for backbone or optical-fiber cables, or where indicated, do not install conduit fittings; use long sweep bends only. Do not use pull boxes in lieu of bends. Install a maximum of two 90 degree bends between pull boxes. Provide pull boxes as required by Utility and CEC.
- .3 Communications systems cabling is to be grouped in dedicated conduits or J-hook supports unless otherwise approved by Departmental Representative. Cabling from different communications systems is not to be mixed.
- .4 Maintain 300 mm clearance between communications cables and AC power cables, power conduit and fluorescent luminaires, unless cables are installed in conduit.

### **3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Division 01 – General Requirements.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements.

### **3.4 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by pathways for communications systems installation.

**END OF SECTION**

## **PART 1 – GENERAL**

### **1.1 RELATED WORK**

- .1 Section 26 05 00 – Common Work Results for Electrical.
- .2 Section 27 05 26 – Grounding and Bonding for Communications Systems.
- .3 Section 27 05 28 – Pathways for Communications Systems.

### **1.2 REFERENCE STANDARDS**

- .1 American National Standards Institute (ANSI)/Telecommunications Industry Association (TIA)
  - .1 ANSI/TIA-568.1-D (2015), Commercial Building Telecommunications Cabling Standard.
  - .2 ANSI/TIA-569-D (2015), Telecommunications Pathways and Spaces.
  - .3 ANSI/TIA-606-C (2017), Administration Standard for Telecommunications Infrastructure.
- .2 Building Industry Consulting Service International (BICSI)
  - .1 Telecommunications Distribution Methods Manual (13<sup>th</sup> Edition).
- .3 Canadian Standards Association (CSA International)
  - .1 C22.2 No. 214-17, Communications Cables (Bi-National standard with UL 444).
- .4 Institute of Electrical and Electronics Engineers (IEEE)
  - .1 IEEE 802.3-2015, IEEE Standard for Ethernet.

### **1.3 SYSTEM DESCRIPTION**

- .1 Structured telecommunications wiring system consists of unshielded-twisted-pair 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.

### **1.4 COORDINATION**

- .1 After tender award and prior to commencing work, meet with Departmental Representative to review work procedures and restrictions related to existing data network infrastructure and equipment.
- .2 Coordinate with Departmental Representative to have obsolete data outlets disconnected from LAN equipment in existing data rack prior to the removal of obsolete cabling and outlets. Contractor's personnel shall not under any circumstance connect or disconnect cross-connect patch cords to or from Owner's LAN equipment or connect any equipment to Owner's network without prior review and approval.

- .3 Coordinate with Departmental Representative and Bell Aliant to have obsolete telephone outlets disconnected prior to removal of obsolete cabling and outlets.
- .4 Coordinate with Departmental Representative and Bell Aliant to have new telephone outlets activated once construction is complete.

## **1.5 CERTIFICATION AND WARRANTY**

- .1 All cabling, termination hardware and connecting cords to be sourced from a certifying manufacturer to assure quality control.
- .2 Upon completion of the installation, the system must be certified by a qualified installer and the manufacturer that it will support Category 6 applications.
- .3 The installed system is to be provided with an end-to-end 20 year system warranty. This warranty shall guarantee against defects in materials and workmanship for the duration of the warranty period and the Certified System Vendor shall repair or replace any failed component, including labour, at no cost to the original registered owner of the Certified Structured Cabling System. This warranty is also to guarantee performance and provide applications assurance for the life of the installation. Provide a warranty certificate issued in the name of the owner to this effect.

## **1.6 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Division 01 – General Requirements.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for structured cabling and associated components and include product characteristics, performance criteria, physical size, finish and limitations.

## **1.7 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Division 01 – General Requirements.
- .2 Operation and Maintenance Data: submit operation and maintenance data for structured cabling and associated components for incorporation into manual.
- .3 Provide record of test results as detailed under FIELD QUALITY CONTROL for incorporation into manual.
- .4 Provide certification and warranty certificate for incorporation into manual.
- .5 As-built Records and Drawings:
  - .1 Provide as-built drawings reflecting cable installation and cross-connections. Drawings to indicate outlet ID at each drop location.

## **1.8 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Division 01 – General Requirements and with manufacturer's written instructions.



- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in clean, dry, well-ventilated location and in accordance with manufacturer's recommendations.
  - .2 Store and protect structured cabling and associated components from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: separate waste materials for reuse and recycling in accordance with Division 01 – General Requirements.

## **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 FT4 to: CSA-C22.2 No. 214.
- .2 Cable jacket colours to be as follows:
  - .1 Voice (telephone): white.
  - .2 Data: blue.

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

- .1 Eight-position modular jack ("RJ-45"), type T568A, Category 6 to ANSI/TIA-568-C.2 and IEEE 802.3:
  - .1 Keystone style.
  - .2 Punch down UTP connector.
  - .3 Modular jack colours to be as follows:
    - .1 Voice (telephone): white.
    - .2 Data: blue.
- .2 Provide compatible single gang faceplates as follows:
  - .1 Flush entry, two (2) jack positions per faceplate.
  - .2 Provide blank fillers for unused jack positions.
  - .3 Top and bottom labeling windows for jack identification.
  - .4 Faceplate colour: white.
- .3 Provide modular furniture adapter white faceplates where indicated and as required, two (2) jack positions per faceplate complete with modular jacks to suit.

### **2.3 UTP CROSS-CONNECT PATCH CORDS**

- .1 UTP cross-connect patch cords 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: ANSI/TIA-568-C.2.

- .2 UTP cross-connect patch cord colour to match horizontal cable colour for application; i.e. voice (telephone), data, etc.

## **2.4 UTP WORK AREA CORDS**

- .1 3.0 metres long, each end equipped with "RJ-45" plug, Category 6 to: ANSI/TIA-568-C.2.
- .2 UTP work area cord colour to match horizontal cable colour for application; i.e. data.
- .3 Provide one (1) UTP work area cord for each work area modular jack.

## **PART 3 – EXECUTION**

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

- .1 Install termination and cross-connect hardware as indicated and according to manufacturers' instructions. Identify and label as indicated to: ANSI/TIA-606-C.

### **3.2 INSTALLATION OF HORIZONTAL DISTRIBUTION CABLES**

- .1 Install horizontal cables in pathways in accordance with Section 27 05 28 – Pathways for Communications Systems.
  - .1 Identify and label as indicated to: ANSI/TIA-606-C.
- .2 Routing of cables must be such that total length does not exceed 90 m.
- .3 Leave sufficient tail at each end for termination of cable.
- .4 Terminate horizontal cables in telecommunications room and at individual work-area jacks using T568A pin assignment. The amount of untwisting in a cable pair to terminate to be no greater than 13 mm.
  - .1 Identify and label as indicated to: ANSI/TIA-606-C.
- .5 Each horizontal cable to have identification markers installed on both ends.
- .6 Each modular jack to be identified with an alpha/numeric label.
- .7 Each patch panel or termination block to have corresponding labeling. Patch panels are to be labelled A, B, C, etc. with A being located near the top of the rack. The ports on each patch panel are to be labelled 1 to 24 or 48 as applicable.
- .8 Coil spare cables and store in ceiling space in zone.
- .9 Harness slack cable in cabinets, racks, and wall-mounted termination and cross-connection hardware.

### **3.3 IMPLEMENT CROSS-CONNECTIONS**

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

### **3.4 FIELD QUALITY CONTROL**

- .1 Test horizontal UTP cables as specified below and correct deficiencies provide record of results as hard copy.
  - .1 Perform tests for Permanent Link on installed cables, including spares:
    - .1 Category 6 using certified level III tester to: ANSI/TIA-568.1-D.

### **3.5 RESTRICTIONS**

- .1 All identification labeling to be mechanically printed with permanent indelible identifying markings. Handwritten labelling is not acceptable.
- .2 Contractor's personnel shall not under any circumstance connect or disconnect cross-connect patch cords to or from Owner's LAN equipment.
- .3 Contractor's personnel shall not under any circumstance connect switches, computers or other equipment to Owners network without prior review and approval by Owner's IT representative. Cross-connections to Owner's LAN equipment must be made by Owner's IT representative only.

**END OF SECTION**