

1.0 General

1.1 SECTION INCLUDES

- .1 Cabling termination specifics
- .2 Cabling identification

1.2 ABBREVIATIONS

- .1 ETL Electronic Testing Laboratories
- .2 IDC Insulation Displacement Connectors
- .3 UTP Unshielded Twisted Pair
- .4 NEXT Near End Crosstalk
- .5 ELFEXT Equal Level Far End Crosstalk
- .6 PSNEXT Power Sum Near End Crosstalk
- .7 PSELFEXT Power Sum Equal Level Far End Crosstalk

1.3 INSTALLER QUALIFICATIONS

- .1 Personnel installing communications cabling shall be trained and conversant with communications cabling practices required for this project.

1.4 SCOPE

- .1 System to be complete with all fiber optic riser cabling, data and voice outlets, fiber cable patch panels, Cat 6 patch panels, patch cords, wire and cable required to form a complete system.
- .2 Install cable in raceway from outlet to cabletray.

1.5 STANDARDS

- .1 Comply with the following standards:
 - .1 TIA/EIA 568-B1, B2 and B3
 - .2 TIA/EIA TSB-67, 72 and 75
 - .3 ANSI/TIA/EIA 568a-1, 2, 3, 4, 5
 - .4 TIA/EIA/IS 729
 - .5 BICSI

2.0 Products

2.1 HORIZONTAL CABLING TO WORKSTATION

- .1 UTP: to CAN/CSA T529-M95 and TIA/EIA 568 - B1, B2, B3, Category 6.
 - .1 Physical Characteristics:
 - .1 Conductors: four-pair, 24 AWG, thermoplastic insulated, solid copper wire.
 - .2 Twists: pairs variably twisted relative to one another. Minimum 29 twists/m per pair.
 - .3 Cable Size: maximum OD 6.4 mm.
 - .4 Breaking strength: 40.8 kg at temperature of $-20^{\circ}\text{C} \pm 1^{\circ}\text{C}$ without jacket or insulation cracking.
 - .5 Colour coding of pairs: tracer coloured white paired with each of blue, orange, green and brown.
 - .6 Fire Rating: plenum-rated overall jacket, CSA FT-4 compliant.

2.2 RISER CABLING

- .1 Fiber Optic Cable Riser:
 - .1 Fiber Optic Cable: to CAN/CSA T529-M95.
 - .1 Physical Description:
 - .1 Twenty-Four (24) strand, 50 micron core/cladding diameter, multimode graded index.
 - .2 Twenty-four (24) strand 50 micron core/cladding diameter, single mode grade index.
 - .3 Continuous operating temperature: -20°C to $+80^{\circ}\text{C}$.
 - .4 Strength member: Aramid.
 - .5 Minimum bend radius for installation to comply with cable manufacturer's requirements.
 - .6 Fire Rating: plenum-rated overall jacket, CSA FT-4 compliant.
 - .2 Quantity: install fibre optic riser cables as shown on drawing.

2.3 COMMUNICATIONS OUTLET ASSEMBLIES

- .1 Communications Outlet - Boxes:
 - .1 100 x 100 recessed box, 63 mm minimum depth with 19 mm deep one device adapter ring, 1.6 mm 16 AWG thickness.
 - .2 27 mm EMT, run from box to cabletray.

2.4 HARDWARE

- .1 Provide all components of a particular type of the same manufacture. (For example: all rack components shall be of common manufacture.)
- .2 Racks:
 - .1 Free standing swing out rack complete with locking mechanism.
 - .2 Grounding provision.
 - .3 ULC compliant.
 - .4 Cable management.
 - .5 18" bottom mounted shelf.
 - .6 Standard of acceptance. X-MARK PXSU-8419.
- .3 UTP Patch Panels: supply all hardware from the same manufacturer.
 - .1 Ports: quantity of panels as indicated on details.
 - .2 Physical, Electrical, Transmission Properties: not less than specified for outlets, Category 6.
 - .3 Horizontal cable management minimum 90 mm high.
 - .4 Grounding lug hardware kit.
 - .5 Panel:
 - .1 Width 483 mm.
 - .2 Multiple of EIA standard module height of 44.45 mm.
 - .3 EIA mounting hole spacing.
 - .6 Panel Height: 178 mm maximum
 - .7 Material: metal of the following minimum thickness:
 - .1 3 mm flat anodized aluminum.
 - .2 1.65 mm formed aluminum.
 - .3 1.9 mm flat steel.
 - .4 1.5 mm formed steel.

.4 Fibre Optic Cable Patch Panels

- .1 Fibre interconnect center rack mounted, low profile, modular design.
- .2 Ports: 48.
- .3 Connectors: feed through type SC.
- .4 Cable management and slack storage designed to accommodate fibre optic cable bend radius.
- .5 Lockable doors or covers for cable termination and patch compartments.
- .6 Anchor points for strain relief of fiber cable entry.
- .7 Grounding provisions.

2.5 PATCH CABLES

.1 Optical fiber patch cords:

- .1 Fiber Core and Cladding: identical to installed cable.
- .2 Transmission Properties: match installed cable's transmission and electrical specifications.
- .3 Configuration:
 - .1 Dual fiber, single jacket, with breakout assemblies separate SC connectors each end.
 - .2 Single fiber dual cable, separate SC connectors each end.
- .4 Factory manufactured
- .5 Quantity – Provide one (1) 3 m patch cord for each patch panel outlet. Patch cord exact length to be confirmed prior to ordering.

.2 Category 6 Patch Cable:

- .1 Quantity – Provide two hundred and fifty (250) patch cords for communication outlets and one patch cord for each port in patch panels.
- .2 All patch cords to be 3.0 meters in length.

2.6 CABLE TRAYS, WIREWAYS AND SURFACE RACEWAYS:

- .1 Provide 600 mm and 300 mm basket type cable tray as shown on drawings.

2.7 IDENTIFICATION MATERIALS

- .1 Lamicoid Nameplates: 3 mm thick plastic engraving sheet, black face, white core, mechanically attached, sizes as follows:
 - .1 Size 1: 12 mm high with 5 mm high letters.
- .2 Wire Identification Materials: Use one of the following:
 - .1 Heat shrink sleeves, blank.
 - .2 Clear plastic tape wrap-on strips with white writing section.
 - .3 Wrap-on strips, pre-numbered.
 - .4 Slip-on identification bead markers or sleeves, blank or pre-numbered.

3.0 Execution

3.1 INSTALLATION

- .1 Cable Installation:
 - .1 Generally install FT4 rated data cable and voice cable in conduit to cabletray.
 - .2 Swab raceway system before installing wiring.
 - .3 Do not exceed manufacturer's maximum pulling force.
 - .4 Maintain not less than minimum bending radius for fiber and copper conductors.
 - .5 Maintain open copper-conductor cable at maximum practical distance from fluorescent ballasts and other EMF - or discharge-generating equipment.
 - .6 Ensure that cable is not flattened, squeezed, or crimped at any point along entire run. No splices or intermediate terminations in cable runs except by special permission in advance, with documentation detailing locations and nature of splices.
 - .7 Install cables in cabletray telecom room and fan individual cables to applicable patch panels in neat, logical fashion.
 - .8 Wrap cables neatly into logical bundles using Velcro wraps.
 - .9 Minimum 3 m of slack cable per run.

.2 Connectors:

- .1 Use tooling specific to connector types in use.
- .2 Use connectors suitable for nature of conductor in cable, e.g. stranded vs solid copper.
- .3 Ensure that connectors' strain relief provisions are used. Strip jackets only amount required.
- .4 Maintain pair twists within 13 mm of termination.
- .5 UTP Connection Configuration in accordance with EIA/TIA 568A-1991 or CAN/CSA-T529-M95.

<u>Pair</u>	<u>Colour</u>	<u>RJ-45 Pins</u>
1	Blue	4
	White/Blue	5
2	White/Orange	3
	Orange	6
3	White/Green	1
	Green	2
4	White/Brown	7
	Brown	8

.3 Outlets, Boxes and Fittings:

- .1 Ensure in advance that outlet box/data outlet installation methods yield vertically-mounted data outlets.
- .2 Install all outlets flush with finished surfaces unless indicated otherwise on the drawings.

.4 Cabinets, Enclosures, Racks, Backboards:

- .1 Install at locations and heights indicated on drawings.
- .2 Use green insulated 6 AWG ground conductors for grounding racks. Use grounding bushing, solderless lug, clamp, or cup washer and screw.
- .3 Protect ground conductors from mechanical injury.
- .4 Install ground conductors such that neither ground conductors nor data cables interfere with one another in regards to future servicing of patch panel rear connections.
- .5 Anchor or stabilize racks as shown on drawing details.

.5 Patch Panels

- .1 Mount patch panels in racks.
- .2 Ground as required by system.
- .3 Mount panels to racks with as many screws as there are mounting holes or slots in panels.
- .4 Provide and install necessary strain reliefs and cable support brackets, plus trays for fibre cable loop behind panel and install cables utilizing such devices.

3.2 COMMUNICATIONS CABLE AND EQUIPMENT LABELING

- .1 Label communication outlets, panels and ports with size 1 lamicoid nameplates.
- .2 Label each of cables with other end's address using Wire Identification Materials.
- .3 Label outlets with labels vertically aligned in each row.
- .4 Position panel labels in the same position on each panel.
- .5 Use the following naming convention when labeling communications cabling components
 - .1 Rack and panel room numbers: XYZ, where:
 - .1 "XY" is floor number represented by two digits.
 - .2 "Z" is a sequential letter (A, B, etc.) designating which room. Riser and equipment rooms are considered equivalent.
 - .2 Outlet Assembly: 000-X where:
 - .1 "000" is a three-digit address.
 - .2 "X" is one of following outlet types:
 - "A" for telephone outlet.
 - "B" for data (copper) outlet.
 - "C" for data (fiber) outlet.
 - .3 Panels:
 - .1 Horizontal Distribution: XYZ-H, where:
 - "XYZ" is room number as described above.
 - "H" indicates "Horizontal".
 - Port Labeling: three-digit address of workstation connected.

- .2 Equipment: XYZ-E
 - "XYZ" is room number as described above.
 - "E" indicates "Equipment".
 - Port Labeling: three-digit sequential number.
- .3 Riser: XYZ-R
 - "XYZ" is room number as described above.
 - "R" indicates "Riser".
 - Port Labeling: three-digit sequential number.
- .4 Attach inter-room connection to identically numbered panel outlets, and, wherever possible, to outlets at same position on each panel.
- .4 Cables:
 - .1 Horizontal Cables:
 - .1 Outlet End: XYZ, where "XYZ" designates panel room number to which cable goes.
 - .2 Panel Room End QR-[OUTLET TYPE], where:

PQR is a three-digit outlet address and OUTLET TYPE is one of the following:

 - A for telephone
 - B for data
 - C for Fiber
 - .3 Equipment Room/Riser/Backbone Cables:

TYPE-[MN]/[XYZ][[0][00]] where destination is another panel room or outlet and where [TYPE] would be:

 - VUTP for (voice UTP).
 - DUTP for (data UTP).
 - FO for (fiber optic).
 - [MN] is sequential number (01, 02, etc.) of cable if multiple runs.
 - XYZ is destination room if cable goes to another panel room.
 - [0]00 is the address of the outlet if cable goes to outlet.

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 - .1 Rack and panel room numbers: XYZ, where:
 - .1 "XY" is floor number represented by two digits.
 - .2 "Z" is a sequential letter (A, B, etc.) designating which room. Riser and equipment rooms are considered equivalent.
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 - .3 Panels:
 - .1 Horizontal Distribution: XYZ-H, where:
 - "XYZ" is room number as described above.
 - "H" indicates "Horizontal".
 - Port Labeling: three-digit address of workstation connected.

.2 Equipment: XYZ-E

- "XYZ" is room number as described above.
- "E" indicates "Equipment".
- Port Labeling: three-digit sequential number.

.3 Riser: XYZ-R

- "XYZ" is room number as described above.
- "R" indicates "Riser".
- Port Labeling: three-digit sequential number.

.4 Attach inter-room connection to identically numbered panel outlets, and, wherever possible, to outlets at same position on each panel.

.4 Cables:

.1 Horizontal Cables:

.1 Outlet End: XYZ, where "XYZ" designates panel room number to which cable goes.

.2 Panel Room End: PQR-[OUTLET TYPE], where:

PQR is a three-digit outlet address and OUTLET TYPE is one of the following:

- A for telephone
- B for data
- C for Fiber

.3 Equipment Room/Riser/Backbone Cables:

TYPE-[MN]/[XYZ][[0][00]] where destination is another panel room or outlet and where [TYPE] would be:

- VUTP for (voice UTP).
- DUTP for (data UTP).
- FO for (fiber optic).
- [MN] is sequential number (01, 02, etc.) of cable if multiple runs.
- XYZ is destination room if cable goes to another panel room.
- [0]00 is the address of the outlet if cable goes to outlet.

END OF SECTION