



# Voice & Data Category 6 Cabling Specification

## **Cable Plant Standards**

# Table of Contents

<b>PART 1 GENERAL GUIDELINES .....</b>	<b>3</b>
1.1 SCOPE .....	3
1.2 CONTACT INFORMATION AND COMMUNICATION REQUIREMENTS .....	3
1.3 INTERRUPTION OF SERVICES .....	4
1.4 APPROVED CONTRACTOR .....	4
1.5 CREW QUALIFICATIONS.....	4
1.6 APPROVED PRODUCTS .....	4
1.7 WORK INCLUDED .....	5
1.8 SUBMITTALS.....	5
1.9 DRAWINGS .....	5
1.10 FUTURE GROWTH CONSIDERATIONS.....	5
1.11 COMMUNICATION CLOSETS MAINTANENCE (MDF) & (IDF) .....	6
1.12 REGULATORY REQUIREMENTS AND REFERENCES .....	6
<b>PART 2 EXECUTION AND PRODUCT .....</b>	<b>7</b>
2.1 HORIZONTAL CABLE .....	7
2.2 BACKBONE COPPER CABLE .....	8
2.3 BACKBONE FIBER CABLE.....	8
2.4 FIBER CONNECTORS .....	9
2.5 FIBER ENCLOSURES AND ADAPTERS.....	9
2.6 FIBER LABELING.....	9
2.7 WORKSTATION .....	9
2.8 WORKSTATION LABELING REQUIREMENTS .....	10
2.9 RACKS AND WIRE MANAGERS .....	10
2.10 PATCH PANELS FOR HORIZONTAL CABLE .....	11
2.11 PATCH PANELS FOR COPPER BACKBONE CABLE.....	12
2.12 PATCH CORDS - COPPER.....	12
2.13 PATCH CORDS - FIBER .....	13
2.14 FIRESTOP SYSTEM.....	13
2.15 GROUNDING AND BONDING .....	13
2.16 OUTSIDE CABLE PLANT .....	13
<b>PART 3 TESTING AND DOCUMENTATION.....</b>	<b>14</b>
3.1 COPPER CHANNEL TESTING .....	15
3.2 FIBER TESTING .....	15
3.3 TEST RESULTS .....	15
3.4 AS-BUILT DRAWINGS .....	16
<b>PART 4 WARRANTY AND SERVICES .....</b>	<b>16</b>
4.1 WARRANTY.....	16
4.2 CONTINUING MAINTENANCE.....	16
4.3 FINAL ACCEPTANCE & SYSTEM CERTIFICATION .....	16

# **PART 1 GENERAL GUIDELINES**

## **1.1 SCOPE**

The intent of this document is to describe the **College of Western Idaho** System requirements for the installation and ongoing service of the Communication Cable and associated hardware in all of our owned facilities.

All cable and related hardware shall be furnished, installed, labeled, tested and documented by the contractor as detailed in this document.

The Horizontal Cabling System shall consist mainly of (1) 4-pair Unshielded Twisted Pair (UTP) Copper Cables per workstation location. There will be exceptions; contractors shall check floor plan for exact cable quantities per location. These cables shall be installed from the Workstation Outlet to the Communications Closet (IDF) located on the same floor, or to the Switch Room (MDF) and terminated as specified in this document on the appropriate hardware.

The Backbone Copper if distance allows, shall consist of 24-Cat6 cables, installed from the Switch Room (MDF) to the Communications Closet (IDF) and terminated as specified in this document on the appropriate hardware.

The Backbone Fiber shall consist of 24-strand Single Mode. Installed from the Switch Room (MDF) to the Communications Closet (IDF) and terminated as specified in this document on the pre-approved hardware. If distance for backbone copper is an issue, backbone fiber shall increase to a 48-strand Single Mode fiber.

Product specifications, general design considerations, and installation guidelines are provided in this document. If the bid documents are in conflict, the specific bid requirements shall take precedence.

The successful vendor shall meet or exceed all requirements for the cable system described in this document. The nCompass warranty, which provides a Limited Lifetime warranty for product and labor, must be in effect upon completion of work.

## **1.2 CONTACT INFORMATION AND COMMUNICATION REQUIREMENTS**

Communications Network Engineering Department

Contractors shall contact the communications department whenever arriving on site.

Providing the following information:

1. All contractor names onsite
2. All projects they will be working that day
3. Location of these projects
4. Status of these projects

Ongoing communication is our best tool to avoid mistakes before they happen. If you're not sure about an issue, please contact the communications department. Contact information will be provided up on awarding of a contract.

### **1.3 INTERRUPTION OF SERVICES**

Any work, which will involve interruption of communication services, must be pre-approved by the communications department, contact information will be provided upon awarding of a contract.

### **1.4 APPROVED CONTRACTOR**

See project specific Invitation to Bid for a list of approved communications contractors. The approved contractor is responsible for workmanship and installation practices in accordance with the Ortronics CIP program. Ortronics/Superior Essex will extend an nCompass Limited Lifetime Warranty to the end user once the contractor fulfills all requirements under Ortronics CIP Program.

### **1.5 CREW QUALIFICATIONS**

At least 30 percent of the copper installation and termination crew must be certified by BICSI or Ortronics with a Technicians Level of Training. Also, at least 10 percent of the optical fiber installation and termination crew must be certified by Ortronics or other approved organizations in Optical Fiber installation and termination practices. The Lead man on all projects shall be BICSI or Ortronics certified in all areas needed to supervise the project. The lead man shall be on site at least 90 percent of the time their crew is on site.

### **1.6 APPROVED PRODUCTS**

Approved 4-pair UTP Cable: Superior Essex DataGain Category 6+ Cable  
(Plenum/Non-Plenum/Limited Combustible)

Approved Optical Fiber Cable manufacturer: Superior Essex

Approved UTP connector product manufacturer: Ortronics

Approved Fiber Optic cabinet product manufacturer: Ortronics

Approved Fiber Optic connectors/splices/couplers: Ortronics

Approved Rack and Cabinet manufacturer: Ortronics

Approved Patch Panel manufacturer: Ortronics

Approved UTP Patch Cord manufacture: Ortronics

## **1.7 WORK INCLUDED**

The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this structured cabling system in compliance with the specifications and drawings. The Telecommunications contractor will provide and install all the required material to form a complete system whether specifically addressed in the technical specifications or not.

The work shall include, but not be limited to the following:

Furnish and install a complete telecommunications wiring infrastructure.

Furnish, install, and terminate all UTP and Optical Fiber cable

Furnish and install all wall plates, jacks, patch panels, and patch cords.

Furnish and install all required cabinets and/or racks as required and as indicated.

Furnish and install all necessary ladder racks to complete telco build.

Furnish any other material required to form a complete system.

Furnish and install all required labeling described in this document.

Perform link testing (100% of horizontal and/or backbone links) and certification of all components.

Furnish test results of all cabling on disk and paper format, listed by each closet, then by workstation ID. This information is to be supplied to the communication department within two weeks, after completion of project.

Adhere and comply with all requirements of Ortronics Certification program.

Provide owner training and documentation. (Testing documentation and As-built drawings)

## **1.8 SUBMITTALS**

Under the provisions of this request for proposal, prior to the start of work the telecommunications contractor shall:

Submit copies of the certification of the company and names of staff that will be performing the installation and termination of the installation to provide proof of compliance of this spec.

Submit proof from manufacturer of contractor's good standing in manufacturer's program.

Submit appropriate cut sheets for all products, hardware and cabling.

## **1.9 DRAWINGS**

It shall be understood that the electrical details and drawings provided with the specification package are diagrammatic. They are intended to show the intent of the specifications and to aid the telecommunications contractor in bidding the job. The telecommunications contractor shall make allowance in the bid proposal to cover whatever work is required to comply with the intent of the plans and specifications.

The telecommunications contractor shall verify all dimensions at the site and be responsible for their accuracy.

Prior to submitting the bid, the telecommunications contractor shall call the attention of the Engineer to any materials or apparatus the telecommunications contractor believes to be inadequate and to any necessary items of work omitted.

## **1.10 FUTURE GROWTH CONSIDERATIONS**

All bids and new installations shall take into consideration the potential of growth. New pathways, cable trays, J hooks, etc. shall be able to handle 25 percent growth without exceeding manufactures fill specifications. Any new copper patch panels or fiber enclosures shall allow for 10 percent growth. There will be projects that need larger growth potential then listed in

this section; the communication department shall inform the contractor of these projects and what materials will be needed.

### **1.11 COMMUNICATION CLOSETS MAINTANENCE (MDF) & (IDF)**

Switch Rooms (MDF) and Communication closets (IDF) cannot be used for storage. Cable, ladders, communication hardware, etc. shall not be left in these rooms for an extended period. Using these rooms for storage violates local fire codes. Contractors are responsible for cleaning up after they are finished with their work, each day. We realize that larger ongoing projects do present problems with storage and keeping the communication closets clean, but the contractor is responsible for storage of the materials used, and cleaning up after them, this is part of every project.

### **1.12 REGULATORY REQUIREMENTS AND REFERENCES**

All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the local Electrical Code and present manufacturing standards.

All materials shall be UL Listed and shall be marked as such. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

All modular jacks, patch cords, consolidation point, and patch cords performance shall be verified (not just tested) by a third party to be category 6 component and channel compliant.

The cabling system described in this is derived from the recommendations made in recognized telecommunications industry standards. The following documents are incorporated by reference:

NEC 2014: National Electric Code, 2014  
ANSI/TIA-568-D, Generic Communications Cabling for Customer Premises  
ANSI/TIA-568-D.1, Commercial Building Telecommunications Infrastructure Standard  
ANSI/TIA-568-D.2, Balanced Twisted-Pair Communications Cabling and Components Standard  
ANSI/TIA-568-D.3, Optical Fiber Cabling Components  
ANSI/TIA-569-D, Commercial Building Standard for Telecommunications Pathways and Spaces  
ANSI/TIA-606 - B, Administration Standard for Telecommunications Infrastructure of Commercial Buildings  
ANSI/TIA-STD-607-B, Commercial Building Grounding and Bonding Requirements for Telecommunications  
ANSI/TIA-758-B, Customer-Owned Outside Plant Telecommunications Cabling Standard  
ANSI/TIA-526-7, Optical Power Loss Measurements of Installed Single Mode Fiber Cable Plant  
ANSI/TIA-526-14-B, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant  
ANSI/TIA-598-C, Optical Fiber Cable Color Coding  
BICSI - TDMM, Building Industries Consulting Services International, Telecommunications Distribution Methods Manual (TDMM) – 13<sup>th</sup> Edition,  
National Fire Protection Agency (NFPA – 70)  
NEMA - National Electrical Manufacture’s Association  
NETA - National Electrical Testing Association  
IEEE - Institute of Electrical and Electronics Engineers  
ICEA - Insulated Cable Engineers Association  
IBC - International Building Code  
IFC - International Fire Code

If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.

This document does not replace any code or laws, either partially or wholly. The contractor must be aware of all local and state codes and laws that may impact this project.

## **PART 2 EXECUTION AND PRODUCT**

### **2.1 HORIZONTAL CABLE**

Horizontal Cable shall be:

Installed in accordance with manufacturer's recommendations and best industry practices.

Termination of cable shall follow EIA/TIA 568B wiring standards.

The contractor shall be responsible for determining if Non-plenum CMR cable is appropriate or if Plenum CMP is needed.

For quantities of cable and height specifications per workstation location refer to floor plan.

Cables shall be installed to the nearest communication closet on the same floor as the workstation.

There will be exceptions to this rule, due to the phasing out of existing IDF'S. If you have questions or concerns please contact the communication department.

Maximum cable length including service loops shall not exceed 295 feet.

Cables shall use established routes, but cannot exceed manufacture's fill specifications for the carrier hardware in use. If this occurs new hardware shall be installed. The contractor will be responsible for creating necessary pathways with the use of conduit and cable tray where appropriate.

Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

At no point shall cable(s) rest on acoustic ceiling grids or panels.

If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at intervals of 4 to 5 feet, staggered to avoid harmonics.

All carrier hardware, on initial install shall not be filled greater than 75 percent of manufactures fill limit, allowing for 25 percent growth potential.

Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

Cable raceways shall not be filled greater than the ANSI/TIA/EIA-569-A maximum fill for the particular raceway type or 40%.

A 10-foot service loop shall be left in the ceiling at the workstation end; this can be accomplished by an extended loop or a figure 8 configuration without exceeding the manufacture's bend radius.

Cable ties are not to be used, only Velcro straps shall be used for securing cables.

Cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.

Maximum pulling tension per cable shall not exceed 25 pounds of force.

Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

Cables shall be identified at both ends with a label. Label shall be placed 3 inches back from the termination point.

The contractor shall only use the parts listed below:

Superior Essex DataGain UTP (CMR Riser-PVC)

Part Number [66-240-4A](#)

Superior Essex DataGain UTP (CMP Plenum-PVC Alloy)

Part Number [66-240-4B](#)

## 2.2 BACKBONE COPPER CABLE

Backbone cable shall be:

Installed in accordance with manufacturer's recommendations and best industry practices

The contractor shall be responsible for determining if Non-plenum CMR cable is appropriate or if Plenum CMP is needed

Backbone cable will consist of 24 Cat6 cables, running from Switch Room (MDF) to each Communication Closet (IDF).

For terminating the backbone cable at the Switch Room (MDF) end, consult the communication department on where and how to terminate.

For terminating at the Communication Closet (IDF) end the 24 Cat 6 cable shall terminate on patch panels.

If the Communication Closet (IDF) is using flat patch panels the cable shall terminate on (1)-24 port Category 6 flat patch panels.

Near end far end labeling scheme shall be used, consult the communication department for this information.

A pull cord (nylon; 1/8" minimum) shall be co-installed with these cable, installed in any conduit. Backbone cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of this cable

Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes

Where backbone cables and distribution cables are installed in a cable tray or wire way, backbone cables shall be bundled separately from the horizontal cables.

The contractor shall only use the parts listed below:

Superior Essex DataGain UTP (CMR Riser-PVC)

Part Number [66-240-4A](#)

Superior Essex DataGain UTP (CMP Plenum-PVC Alloy)

Part Number [66-240-4B](#)

## 2.3 BACKBONE FIBER CABLE

Fiber Backbone cable shall be:

Installed in accordance with manufacturer's recommendations and best industry practices

All fiber cable installed shall be Superior Essex.

Premise Single-mode cable shall be yellow in color.

Premise fiber shall be Interlock Armored.

Outside building projects shall use OSP (Outside Plant) rated Fiber, which will incorporate a fully water-blocked core using a dry water blocking system.

Contact communication department for location and length of fiber service loop on a per job basis.

The contractor shall be responsible for determining if Riser rated Fiber and Innerduct is appropriate or if Plenum rated material is needed.

Premise Backbone Fiber Cable:

Superior Essex Single Mode reduced water peak

OFNP Part Number L40243K1Q (24 FIBER) or L40483401 (48 FIBER)



OFNR Part Number L30243K1Q (24 FIBER) or L30483401 (48 FIBER)

OSP Backbone Fiber Cable

Superior Essex Dri-Lite Loose Tube Single Jacket All Dielectric  
Part Number 110483D01

## 2.4 FIBER CONNECTORS

All Fiber shall be terminated using Single Mode, LC, Fusion Splice On Connectors.

Ortronics SOC (Single Mode, LC)  
Part Number 205KNF9SA-09

## 2.5 FIBER ENCLOSURES AND ADAPTERS

All fiber shall land in an Ortronics fiber enclosure and into Ortronics adapter panels.

Part Numbers

1RU Enclosure EQ01U-CHC  
2RU Enclosure EQ02U-CHC  
4RU Enclosure EQ04U-CVC  
Single Mode LC Adapter OR-OFP-LCD12AC (12 FIBERS)  
Single Mode LC Adapter OR-OFP-LCQ24AC (24 FIBERS)

## 2.6 FIBER LABELING

Far end labeling scheme shall be used, consult communication department for this information.

Labels shall be printed using a hand held printer such as a Brother P-touch.

All labels shall be uppercase print

All labels shall be printed using black on white tape

All labels shall be installed before the testing process begins

The labeling scheme shall have four sections, reading left to right

1. Communication closet
2. Enclosure
3. Panel within enclosure
4. Port of panel

## 2.7 WORKSTATION

Work areas shall be:

Installed in accordance with manufacturer's recommendations and best industry practices.

Termination of cable shall follow EIA/TIA 568B wiring standards.

Termination of locations for wireless access points shall utilize surface mounts box and single port face plates above the ceiling grid.

Termination of locations for ceiling mounted projector locations shall use RJ-45 connectors.

Termination locations for video surveillance camera locations shall use RJ-45 connectors.

The contractor shall be responsible for determining the optimum compliant configuration based on the products proposed.

The same orientation and positioning of jacks and connectors shall be utilized throughout the installation.

Bend radius of the horizontal cable shall not be less than 4 times the outside diameter of the cable

A 10-foot service loop shall be left in the ceiling; this can be accomplished by an extended loop or a figure 8 configuration without exceeding the manufacture's bend radius.

In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. No more than 12 inches of slack shall be stored in an in-wall box, modular furniture raceway, or insulated wall.

The cable jacket shall be tight to lacing cap maintaining pair twist.

Jack shall have slide lock to lock jack into faceplate or patch panel thus allowing for toolless removal.

Cable wrap labels shall be 3 inches from termination point.

Face plate and Jack colors may vary depending on what the building is using for electrical faceplate material and color.

The contractor shall only use the parts listed.

#### Ortronics Part Numbers

Modular Jack Cat6 [HDJ6](#)

HDJ Blanks [HDJBL10](#)

1 port Face Plate [403HDJ11](#)

2 port Face Plate [403HDJ12](#)

4 port Face Plate [403HDJ14](#)

6 port Face Plate [403HDJ16](#)

12 port Face Plate [403HDJ212](#)

1 port Stainless Steel Face Plate 403SHDJ11

2 port Stainless Steel Face Plate 403SHDJ12

4 port Stainless Steel Face Plate 403SHDJ14

6 port Stainless Steel Face Plate 403SHDJ16

12 port Stainless Steel Face Plate 403SHDJ212

## 2.8 WORKSTATION LABELING REQUIREMENTS

All modular jacks shall:

All labels shall be printed using a hand held printer such as a Brother P-touch. Hand written labels are not permitted.

All labels shall be installed behind the jack dust cap, except on a 6 jack location. On these jacks the top and bottom inserts will use the dust cover just like a standard 4 jack location, the center inserts shall use stick on labels above their respective insert. This is the only application in which stick on labels shall be used.

All labels shall be uppercase print

All labels shall be printed using black on white tape

This information will be on the faceplate and both ends of the horizontal cable.

All labels shall be installed before the testing process begins.

The labeling scheme will have three sections, reading left to right

1. Communication closet
2. Patch panel letter
3. Patch panel port number

Ex: 2B23

## 2.9 RACKS AND WIRE MANAGERS

The positioning of all racks within communication closets shall be discussed with the communication department before being installed.

Racks shall be securely attached to the floor using 1/2" hardware or as required by local codes.

Whenever possible, racks shall be placed with 36 inches of clearance from all walls on all sides.

All racks shall be grounded to the telecommunications ground bus bar in accordance with Section 2.16 of this document.

All racks and wire management shall be Ortronics.

Equipment racks shall provide vertical cable management and protection for the horizontal cables inside the rails of the rack.

Waterfall cable management shall be provided at the top of the rack for patch cords and for horizontal cables entering the rack channels for protection and to maintain proper bend radius and cable support.

Wire management shall also be installed as needed.

The rack shall include mounting brackets for cable tray ladder rack to mount to the top of the rack.

Velcro cable ties shall be provided inside the rack channels to support the horizontal cable.

Racks shall be black in color to match the patch panels and cable management.

Provide necessary strain relief, bend radius and cable routing for proper installation of high Performance cross connect products, meeting all specifications of ANSI/TIA-568-C.

Have top cable trough with waterfall and built in patch/horizontal cable distribution separator.

Have EIA hole pattern on front and rear.

Rack height shall be specified as 7 ft. (45 rack units)

Be available with hook and loop straps for securing bulk cables inside the vertical U-channels.

Provide floor and ceiling access for cable management and distribution.

Provide pre-drilled base for floor attachment of rack.

Be manufactured by an ISO 9001 registered company.

Vertical wire managers shall have a solid door and hinge on both sides.

Horizontal wire managers shall be 2RU when installed in 2 post rack and 1RU when installed in wall mounted racks.

The contractor shall only use the part listed below.

#### Part Numbers

Rack MM20710-B  
Vertical Wire Manager MM20VMD706-B (at edge of racks in row)  
Vertical Wire Manager MM20VMD710-B (between all racks)  
Horizontal Wire Manager 2U Model – 60400057 (standing racks)  
Horizontal Wire Manager 1U Model – 60400131 (wall cabinets)

Wall mounted rack shall be:  
12RU or 18RU depending on location and be with a perforated front door and dual doors for access to front and back.

Ortronics Part Number SWM12RUPD-26-26  
Ortronics Part Number SWM18RUPD-26-26

## **2.10 PATCH PANELS FOR HORIZONTAL CABLE**

Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA-568-D standard, manufacturer's recommendations and best industry practice.

The positioning of all patch panels and size of panels within the racks shall be discussed with the communication department before being installed.

On initial install sizing of patch panels shall allow for a 10 percent growth potential.

Existing racks that are using flat patch panels will continue to use flat patch panels.

New racks will use flat patch panels; flat and angled patch panels shall not be installed in the same rack.

Each panel shall be labeled with an uppercase letter. Letter A being the top panel, then working downward.

Each panel shall be fed by an individual bundle, separated and dressed back to the point at which the cable enters the rack.

The top panel should be fed from one side of the rack, the next panel down should be fed from the opposite side. This will stagger the bundles, which will improve the flow of the cables going down the rack.

Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

The cable jacket shall be maintained to within one inch of the termination point.

Pair untwist at the termination shall not exceed one-half inch

Cables shall be identified with a label. Label shall be placed 3 inches back from the termination point

The Modular Patch Panels shall:

Meet category 6 component compliance

Be verified by a third-party nationally recognized independent testing laboratory

Use low emission IDC contacts

Use dual reactance technology to enhance the signal-to-noise ratio

Require standard termination practices using a 110-impact tool

Use a single piece IDC housing designed to accept larger Category 6 conductors

Support both T568B and T568A wiring

Include easy to follow wiring labels

Include label fields

Allow for the use of icons

Include full-length metal rear cable management

Be available in standard or high density

Be backward compatible to category 3, 5 and 5e

Be center tuned to category 6 test specifications

The modular patch panel shall be one of the following by Ortronics for an nCompass Solution:

Part Numbers

24 Port OR-PHD66U24

48 Port OR-PHD66U48

## **2.11 PATCH PANELS FOR COPPER BACKBONE CABLE**

The positioning of backbone patch panels within racks shall be discussed with the communication department before being installed.

The patch panels for backbone connectivity shall be category 6 compliant.

Near end far end labeling scheme shall be used, consult the communication department for this information.

The modular patch panel shall be the following by Ortronics for a nCompass Solution:

Part Numbers

24 Port OR-PHD66U24

## **2.12 PATCH CORDS - COPPER**

The contractor shall provide a total of 2 patch cords per data cable pulled per the below specs:

One (1) shall be 5' in length and One (1) shall be 10' in length. Typically, white in color. Confirm color with IT communications department.

Copper (UTP) patch cords shall:

Be an Ortronics EZ Patch EZC605Q50-09 (5', white, qty 50 per box) and EZC610Q40-09 (10', white, qty 40 per box), category 6 Clarity patch cord with Paralign 2 Plug Design.

Use 8 position connector with impedance matched contacts and designed using dual reactance.

Be constructed of 100 ohm, 4 pair, 24 AWG, stranded conductor, unshielded twisted pair copper per the requirements of the ANSI/TIA-568-D and ANSI/TIA-568-D.1 standard.

Meet TIA category 6 component specifications in ANSI/TIA/EIA-568-D.1.  
100% factory tested to meet category 6 performance and ETL or any other nationally recognized 3<sup>rd</sup> party verification.  
Be center tuned to category 6 performance specifications by using paired bi-level contact array.  
Be capable of universal T568A or T568B wiring schemes.  
Modular connector shall maintain the paired construction of the cable to facilitate minimum untwisting of the wires.  
Have a performance marking indelibly labeled on the jacket (by the manufacturer).  
Have the ability to accept color-coded labels and icons to comply with ANSI/TIA-606-B labeling specifications.  
Have “snagless” protection for the locking tab to prevent snagging and to protect locking tab in tight locations and provide bend relief  
Be available in 5 feet and 10 feet lengths.  
Be backward compatible to Category 3, 5 and 5e.  
Be manufactured by an ISO 9001 registered company.

### **2.13 PATCH CORDS - FIBER**

The contractor shall provide fibers patch cords for 50% of fiber installed. All fiber patch cords shall be Single Mode LC-LC. 1 Meters in length.

Fiber Patch Cords shall:  
Be an Ortronics L1-0101B2JYD001M (OS2 LC-LC)

### **2.14 FIRESTOP SYSTEM**

All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate STI brand EZ Path firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.  
All work and materials used must meet or exceed the local fire codes.

### **2.15 GROUNDING AND BONDING**

A grounding busbar shall be installed in all communication rooms (MDF) and communication closets (IDF).  
This busbar shall be bonded to the nearest building electrical ground, using a minimum of insulated 6 AWG stranded copper cable.  
All bonding conductor cables shall be green in color.  
All communication equipment: racks, ladder racks, cable trays, lighting protection, splice cases, etc. shall be bonded to its associated busbar using a minimum insulated 6 AWG stranded copper cable.

### **2.16 OUTSIDE CABLE PLANT**

The planning or installation of any building to building communication pathways buried or aerial shall be discussed with the communication department before any work begins.  
The sizing and specifications of the communication hardware used shall be decided on a per job basis.  
All copper and fiber cabling installed building to building shall be outside rated.

All copper cable shall have lightning protection at both ends. The protectors shall be bonded with a minimum of # 6 AWG copper bonding conductor between the protector ground lug and its associated busbar. Approved manufacturer of protection units is Circa.

All buried cable shall be enclosed in a PVC conduit.

Conduit shall be buried at a minimum depth of 24 inches, cannot have any bends greater than 90 degrees and have a pull tape installed for future use.

## **PART 3 TESTING AND DOCUMENTATION**

### **GENERAL**

1. The following specification and its associated drawings are intended to provide a set of instructions and materials needed to furnish and install Telecommunications Cabling, within parameters set by industry standards, in a new or remodeled facility.
  - A. The information is modular in nature.
    1. Each facility will have one or more of each module discussed.
    2. Specifically included in this specification are cables, connecting hardware and channel performance requirements to provide a Category 6 compliant channel to each data port of the workstations.
  - B. Some of the information contained in the following is directed to the owner's architects, electrical, mechanical, and structural engineers. This information points toward ideal conditions and may vary by site depending on actual conditions.

All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA-568-D. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the Ortronics Certification Program Information Manual and best industry practice. All testing must meet or exceed all nCompass warranty requirements, resulting in receiving their Limited Lifetime warranty.

### **3.1 COPPER CHANNEL TESTING**

All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, and opens. Additional testing is required to verify Category performance.

Horizontal cabling shall be tested using a Level V test unit for category 6 performance compliance.

Tester shall have been calibrated by manufacture within the last 12 months.

The basic tests required are:

- Wire Map
- Length
- Attenuation
- NEXT (Near end crosstalk)
- Return Loss
- ELFEXT Loss
- Propagation Delay
- Delay skew
- PSNEXT (Power sum near-end crosstalk loss)
- PSELFEXT (Power sum equal level far-end crosstalk loss).

### **3.2 FIBER TESTING**

All fiber testing shall be performed on all fibers in the completed end to end system.

There shall be no splices unless clearly defined in an RFP.

Testing shall consist of an end to end OLTS (Optical Loss Test Set).

All fiber shall be tested in both directions (bi-direction).

Fiber length shall be part of the test results.

Single Mode links shall be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA-526-7, Method A.1 One Reference Jumper equivalent method.

OLTS testing shall be performed with an approved hand held tester and shall have been calibrated by manufacture with in the last 12 months.

Fluke Networks CertiFiber Pro

### **3.3 TEST RESULTS**

Test documentation shall be provided to the communication department on disk within two weeks after completion of project. The disk shall be clearly marked on the outside front cover with: the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference and setup.

The field test equipment shall meet the requirements of ANSI/TIA-568-D including applicable TSB's and amendments. The appropriate Level V tester shall be used to verify Category 6 cabling systems.

When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

### **3.4 AS-BUILT DRAWINGS**

Projects with 20-cables or more the contractor shall provide a floor plan with each workstation location number printed on that plan. This information should be put on the plan after the location has been tested, this will help ensure its accuracy. The as-built drawings shall be delivered to the communication department, when completed and verified by the contractor.

## **PART 4 WARRANTY AND SERVICES**

### **4.1 WARRANTY**

The nCompass Warranty combines a Limited Lifetime extended product warranty with a Limited Lifetime applications assurance warranty. Ortronics/Superior Essex (Manufacturer) provides the warranty directly to the end-user.

An Extended Product Warranty shall be provided which warrants functionality of all components used in the system for a Limited Lifetime from the date of registration. The Extended Product Warranty shall warrant the installed horizontal and/or backbone copper, and both the horizontal and the backbone optical fiber portions of the cabling system.

The Application Assurance Warranty shall cover the failure of the wiring system to support the applications that are designed for the link/channel specifications of ANSI/TIA-568-D. These applications include, but are not limited to, 10BASE-T, 100BASE-T, 1000BASE-T, and 155 Mb/s ATM.

The contractor shall provide a warranty on the physical installation.

### **4.2 CONTINUING MAINTENANCE**

MACs shall be performed by an Ortronics CIP Contractor and shall be added to the nCompass warranty when registered with Ortronics.

### **4.3 FINAL ACCEPTANCE & SYSTEM CERTIFICATION**

Completion of the installation, in-progress and final inspections, receipt of the test and as-built documentation, and successful performance of the cabling system for a two week period will constitute acceptance of the system. Upon successful completion of the installation and subsequent inspection, the end user shall be provided with a numbered certificate, from Ortronics registering the installation.