# THE NEW SURREY HOSPITAL AND BC CANCER CENTRE PROJECT

Schedule 1 – Statement of Requirements

Appendix 1M – PHSA Communications Infrastructure Standards and Specifications

#### 1.1 General

- 1.1.1 The PHSA Communications Infrastructure Standards and Specifications is the supporting document to the requirements identified in the Communications (Division 27) Section of Schedule 1 [Statement of Requirements];
- 1.1.2 Refer to Section 2.5.9 of Schedule 1 [Statement of Requirements] as it pertains to the appropriate use of the PHSA Communications Infrastructure Standards and Specifications in the creation of Division 27 specifications for this Project; and
- 1.1.3 In the event the PHSA Communications Infrastructure Standards and Specifications conflict with any other requirements in this Agreement, the more stringent requirement will apply unless otherwise approved by the Authority.

#### 1.2 Application

- 1.2.1 The PHSA Communications Infrastructure Standards and Specifications apply to all types of projects and healthcare facilities;
- 1.2.2 For the New Surrey Hospital and Cancer Centre Project, there are certain sections, references, requirements, standards, specifications and drawings contained within the PHSA Communications Infrastructure Standards and Specifications that will not apply. These are as follows:
  - 1.2.2.1 References, requirements, standards, specifications and drawings related to Community Sites;
  - 1.2.2.2 References, requirements, standards, specifications and drawings related to Category 6 horizontal cabling; and
  - 1.2.2.3 References, requirements, standards, specifications and drawings related to electrical and mechanical requirements for Communications Rooms. The Design-Builder is to refer to Schedule 1 [Statement of Requirements] and other associated appendices for the requirements concerning this scope.

#### 1.3 Manufacturers and Products

- 1.3.1 All signal carrying components of the Structured Cabling system for the New Facility will be provided from a single manufacturer. The approved manufacturers for these components are Belden and CommScope;
  - 1.3.1.1 The following table lists the minimum standard of Belden product to be used on this Project.

Product Name	Product Description	Part Number
REVConnect 10GX UTP Modular Jack	REVConnect 10GX UTP Modular Jack, T568 A/B, Single Pack	RVAMJKUXX-S1
KeyConnect Faceplate	KeyConnect Faceplate; 4-port, with ID Windows, Single Gang	AX102249
KeyConnect Faceplate	KeyConnect Wall Mount Phone Plate; 1-port, (recessed port), Single Gang	AX104126
KeyConnect Faceplate	KeyConnect Modular Furniture Faceplate; 4-port, with ID Windows, Single Gang	AX103926
KeyConnect Side-Entry Box	KeyConnect 2-port Side Entry Box without Shutter Door	AX105353-EW
10GX REVConnect Patch Panel	10GX REVConnect Patch Panel, 24-Port, 1U (Preloaded)	RVAPPF1U24BK-P
10GX REVConnect Patch Panel	10GX REVConnect Patch Panel, 48-Port, 2U (Preloaded)	RVAPPF1U24BK-P
CAT6A 10GX Small Diameter	CAT6A Enhanced (625MHz), 4-Unbonded-Pair, Plenum-CMP 105C OR CMP-LP (0.7A) OR CL3P-LP (0.7A), Premise Horizontal cable, 23 AWG Solid Bare Copper conductors, FEP insulation, patented EquiSpline™ & EquiBlock™ Technologies, ripcord, Flamarrest® jacket	10GXS13

#### PHSA COMMUNICATIONS INFRASTRUCTURE STANDARDS AND SPECIFICATIONS

Product Name	Product Description	Part Number
CAT6A 10GX Small Diameter	CAT6A Enhanced (625MHz), 4-Unbonded-Pair, Riser-CMR 90C OR CMR-LP (0.6A) OR CL3R-LP (0.6A), Premise Horizontal cable, 23 AWG Solid Bare Copper conductors, polyolefin insulation, patented Equispline™ & EquiBlock™ Technologies, ripcord, PVC jacket	10GXS12
CAT6A Performance Modular Cord	CAT6A Performance Patch Cord, 4-Pair, 28 AWG Stranded, CMR, T56A/B-T568A/B Grey, 1.0 ft. (0.20 m)	CAD1108001
CAT6A Performance Modular Cord	CAT6A Performance Patch Cord, 4-Pair, 28 AWG Stranded, CMR, T56A/B-T568A/B Grey, 4.0 ft. (1.2 m)	CAD1108004
CAT6A Performance Modular Cord	CAT6A Performance Patch Cord, 4-Pair, 28 AWG Stranded, CMR, T56A/B-T568A/B Grey, 7.0 ft. (2.1 m)	CAD1108007
CAT6A Performance Modular Cord	CAT6A Performance Patch Cord, 4-Pair, 28 AWG Stranded, CMR, T56A/B-T568A/B Grey, 10 ft. (3.1 m)	CAD1108010
10GX Modular Cord	10GX Patch Cord, Bonded-Pair, 4-Pair, 24 AWG Solid, CMR, T568A/B-T568A/B, Grey, 10 ft. (3.0 m).	CA21108010
10GX Modular Cord	10GX Patch Cord, Bonded-Pair, 4-Pair, 24 AWG Solid, CMR, T568A/B-T568A/B, Grey, 25 ft. (7.6 m)	CA21108025
10GX Modular Cord	10GX Patch Cord, Bonded-Pair, 4-Pair, 24 AWG Solid, CMR, T568A/B-T568A/B, Grey, 30 ft. (9.1 m)	CA21108030
FiberExpress Ultra HD Patch Panel	FiberExpress Ultra HD Patch Panel Housing 4U, Empty, Titanium	AX104683
FiberExpress Ultra HD Patch Panel	FiberExpress Ultra HD Patch Panel Housing 2U, Empty, Titanium	AX104682
FiberExpress Ultra HD Patch Panel	FiberExpress Ultra HD Splice Housing Kit, 1U, Empty, Titanium	AX104681
FX UHD Splicing Cassette	FX UHD Cassette, OM5, 12 Ports, Splicing, LC Duplex	FC5H12LDFS
FX UHD Splicing Cassette	FX UHD Cassette, ONS, 12 Forts, Splicing, LC Duplex, Blue Adapters	FCSH12LDFS
	FX Indoor/Outdoor OS2 Distribution Tight Buffer 24 Fibers OFCP Aluminum Interlocked Armor Non-Unitized Yellow Jacket	FDSD024A9Y
3	FX Indoor/Outdoor OS2 Distribution Tight Buffer 12 Fibers OFCP Aluminum Interlocked Armor Non-Unitized Yellow Jacket	FDSD012A9Y
Indoor/Outdoor Plenum OM5 Distribution Tight Buffer 24f	FX Indoor/Outdoor OM5 Distribution Tight Buffer 24 Fibers OFCP Aluminum Interlocked Armor Non-Unitized Lime Green Jacket	FD5D024A9L
Indoor/Outdoor Plenum OM5 Distribution Tight Buffer 12f	FX Indoor/Outdoor OM5 Distribution Tight Buffer 12 Fibers OFCP Aluminum Interlocked Armor Non-Unitized Lime Green Jacket	FD5D012A9L
FiberExpress Duplex Patch Cord	FX Patch Cord, OM5, LC Duplex - LC Duplex, 1 M, OFNR, Duplex ZIP 2.0 MM, A-TO-B, Lime Green Jacket	FP5LDLD001M
FiberExpress Duplex Patch Cord	FX Patch Cord, OM5, LC Duplex - LC Duplex, 3 M, OFNR, Duplex ZIP 2.0 MM, A-TO-B, Lime Green Jacket	FP5LDLD003M
FiberExpress Duplex Patch Cord	FX Patch Cord, OM5, LC Duplex - LC Duplex, 4 M, OFNR, Duplex ZIP 2.0 MM, A-TO-B, Lime Green Jacket	FP5LDLD004M
FiberExpress Duplex Patch Cord	FX Patch Cord, OM5, LC Duplex - LC Duplex, 6.1 M, OFNR, Duplex ZIP 2.0 MM, A-TO-B, Lime Green Jacket	FP5LDLD06M1
FiberExpress Duplex Patch Cord	FX Patch Cord, OS2, LC Duplex - LC Duplex, 1.5 M, OFNR, Duplex ZIP 2.0 MM, A-TO-B, Yellow Jacket	FPSLDLD01M5
FiberExpress Duplex Patch Cord	FX Patch Cord, OS2, LC Duplex - LC Duplex, 2.1 M, OFNR, Duplex ZIP 2.0 MM, A-TO-B, Yellow Jacket	FPSLDLD02M1
FiberExpress Duplex Patch Cord	FX Patch Cord, OS2, LC Duplex - LC Duplex, 3 M, OFNR, Duplex ZIP 2.0 MM, A-TO-B, Yellow Jacket	FPSLDLD003M
FiberExpress Duplex Patch Cord	FX Patch Cord, OS2, LC Duplex - LC Duplex, 4 M, OFNR, Duplex ZIP 2.0 MM, A-TO-B, Yellow Jacket	FPSLDLD004M
FiberExpress Duplex Patch Cord	FX Patch Cord, OS2, LC Duplex - LC Duplex, 6.1 M, OFNR, Duplex ZIP 2.0 MM, A-TO-B, Yellow Jacket	FPSLDLD06M1
D-Series Inside Wire and Backbone Indoor Cable Category 3	D-Inside Wire, Nonbonded-Pair, 24 AWG, CMR, Category 3. 25 Pair	DIW25
D-Series Inside Wire and Backbone Indoor Cable Category 3	D-Inside Wire, NonBonded-Pair, 24 AWG, CMR, Category 3. 50 Pair	DIW50
D-Series Inside Wire and Backbone Indoor Cable Category 3	D-Inside Wire, NonBonded-Pair, 24 AWG, CMR, Category 3. 100 Pair	DIW100
D-Series Inside Wire and Backbone Indoor Cable Category 3	D-Inside Wire, NonBonded-Pair, 24 AWG, CMR, Category 3. 200 Pair	DIW200
GigaBIX Termination Kit, 300-pair	GigaBIX Termination Kit, 300-pair*	AX101471
GigaBIX Management Ring	D-Ring*	AX101478

### 1.3.1.2 The following table lists the minimum standard of CommScope product to be used on this Project.

Product Name	Product Description	Part Number
Outlet / Field Jack	MGS600 Information Outlet, Black	MGS600-003
Patch Panel Jack	GigaSPEED X10D HGS620 Shielded High Density Information Outlet	HGS620
Flushmount Faceplate	M14L-262 Flush Mount Faceplate; 4-port, White	M14L-262
Wall Mount Phone Faceplate	Wall Mount Phone Plate; 1-port, (recessed port), Single Gang	M10LW4SP
Furniture Faceplate	M14C Type Furniture Faceplate, 4-port Black	M14C-003
2 Port Surface Mount Box	M102SMB-B0262 Dual Port White Surface Mount Box	M102SMB-B-262
Systimax 10G Patch Panel, 24-Port, Flat	10G Patch Panel, 24-Port, Flat 1U (Preloaded Discreet Jacks)	360-IPR-MFTP-E- HD6B-1U-24
Systimax 10G Patch Panel, 48-Port, Flat	10G Patch Panel, 48-Port, Flat 2U (Preloaded Discreet Jacks)	360-IPR-MFTP-E- HD6B-2U-48
CAT6A 10G (Small Diameter) Blue CMP	Systimax Cat6A, Blue, CMP	2091B
CAT6A 10G (Small Diameter) Blue CMR	Systimax Cat6A, Blue, CMR	1091B
CAT6A 28 AWG Small Diameter Cord	CAT6A Performance Patch Cord, 4-Pair, 28 AWG Stranded, CMR, T56A/B-T568A/B Grey, 1.0 ft. (0.20 m)	CO199K2-03F001
CAT6A 28 AWG Small Diameter Cord	CAT6A Performance Patch Cord, 4-Pair, 28 AWG Stranded, CMR, T56A/B-T568A/B Grey, 5.0 ft. (1.5 m)	CO199K2-03F005
CAT6A 28 AWG Small Diameter Cord	CAT6A Performance Patch Cord, 4-Pair, 28 AWG Stranded, CMR, T56A/B-T568A/B Grey, 7.0 ft. (2.1 m)	CO199K2-03F007
CAT6A 28 AWG Small Diameter Cord	CAT6A Performance Patch Cord, 4-Pair, 28 AWG Stranded, CMR, T56A/B-T568A/B Grey, 10 ft. (3.1 m)	CO199K2-03F010
10G Cat6A Modular Cord	10GX Patch Cord, 4-Pair, 24 AWG Solid, CMR, T568A/B-T568A/B, Grey, 10 ft. (3.0 m).	CPCSSX2-03F010
10G Cat6A Modular Cord	10GX Patch Cord, 4-Pair, 24 AWG Solid, CMR, T568A/B-T568A/B, Grey, 25 ft. (7.6 m)	CPCSSX2-03F025
10G Cat6A Modular Cord	10GX Patch Cord, 4-Pair, 24 AWG Solid, CMR, T568A/B-T568A/B, Grey, 30 ft. (9.1 m)	CPCSSX2-03F030
Systimax Fiber Patch Panel 1U	SYSTIMAX EHD 1U sliding tray fber panel, accepts (6) EHD ULL modules, splice cassettes, providing up to 72 duplex LC ports	EHD-1U
Systimax Fiber Patch Panel 2U	SYSTIMAX EHD 2U sliding tray fber panel, accepts (12) EHD ULL modules, splice cassettes, providing up to 144 duplex LC ports	EHD-2U
Systimax Fiber Patch Panel 4U	SYSTIMAX EHD 4U sliding tray fber panel, accepts (24) EHD ULL modules, splice cassettes, providing up to 288 duplex LC ports	EHD-4U
EHD Splicing Cassette 12-Port	EHD ULL 24f LC stranded pigtail splice cassette OM5	EHD-FT-00-LC- WB-00-00
EHD Splicing Cassette 12-Port	EHD ULL 24f LC UPC stranded pigtail splice cassette SM	EHD-FT-00-LC- SM-00-00
Fiber Adapters and Connectors	Qwik-Fuse Connector, LC, OM3/OM4/OM5, Aqua, for 1.6/2.0 mm, 12 per pack.	760243371 I MFC- LCF-20-5Y-12- PACK
Fiber Adapters and Connectors	Qwik-Fuse Connector, LC, SM-UPC, Blue, for 250µm/900µm, 12 per pack.	7602433721 SFC- LCF-09-8Y-12- PACK
Indoor Plenum OS2 Distribution Tight Buffer 24f	TeraSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit	P-024-DZ-8W- FSUYL
Indoor Plenum OS2 Distribution Tight Buffer 12f	TeraSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 12 fiber single-unit	P-012-DZ-8W- FSUYL
Indoor Plenum OM5 Distribution Tight Buffer 24f	LazrSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit	P-024-DZ-5G- FSULM
Indoor Plenum OM5 Distribution Tight Buffer 12f	LazrSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 12 fiber single-unit	P-012-DZ-5G- FSULM
Indoor/Outdoor Plenum OS2 Distribution Tight Buffer 24f	TeraSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit	P-024-OZ-8W- FSUBK
Indoor/Outdoor Plenum OS2 Distribution Tight Buffer 12f	TeraSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 12 fiber single-unit	P-012-OZ-8W- FSUBK

<sup>\*</sup> These products are always used for the Category 3 copper backbone regardless of which manufacturer is selected for the Project.

<sup>\*\*</sup> The above list is not intended to be exhaustive of all signal carrying components products required to meet the requirements in the Communications (Division 27) Section of Schedule 1 [Statement of Requirements].

Product Name	Product Description	Part Number
Indoor/Outdoor Plenum OM5	LazrSPEED® Plenum Distribution Cable, interlocking	P-024-LZ-5G-
Distribution Tight Buffer 24f	aluminum armored with plenum jacket, 24 fiber single-unit	FSUBK
Indoor/Outdoor Plenum OM5	LazrSPEED® Plenum Distribution Cable, interlocking	P-012-LZ-5G-
Distribution Tight Buffer 12f	aluminum armored with plenum jacket, 12 fiber single-unit	FS12BK/25D
OM5 Duplex Patch Cord 1.0m	Ultra Low Loss (ULL) LazrSPEED® 550 WideBand OM5 LC to LC,	UFVLCLC42-
	Fiber Patch Cord, 1.6 mm Duplex, Plenum 1.0m	NXF003
OM5 Duplex Patch Cord 1.5m	Ultra Low Loss (ULL) LazrSPEED® 550 WideBand OM5 LC to LC,	UFVLCLC42-
	Fiber Patch Cord, 1.6 mm Duplex, Plenum 1.5m	NXF005
OM5 Duplex Patch Cord 2.1m	Ultra Low Loss (ULL) LazrSPEED® 550 WideBand OM5 LC to LC,	UFVLCLC42-
	Fiber Patch Cord, 1.6 mm Duplex, Plenum 2/1m	NXF007
OM5 Duplex Patch Cord 3.0m	Ultra Low Loss (ULL) LazrSPEED® 550 WideBand OM5 LC to LC,	UFVLCLC42-
	Fiber Patch Cord, 1.6 mm Duplex, Plenum 3.0m	NXF010
OM5 Duplex Patch Cord 4.6m	Ultra Low Loss (ULL) LazrSPEED® 550 WideBand OM5 LC to LC,	UFVLCLC42-
	Fiber Patch Cord, 1.6 mm Duplex, Plenum 4.6m	NXF015
OM5 Duplex Patch Cord 6.1m	Ultra Low Loss (ULL) LazrSPEED® 550 WideBand OM5 LC to LC,	UFVLCLC42-
	Fiber Patch Cord, 1.6 mm Duplex, Plenum 6.1m	NXF020
OS2 Duplex Patch Cord 1.5m	Ultra Low Loss (ULL) TeraSpeed LC to LC, Fiber Patch Cord, 1.6 mm	UFGLCLC42-
	Duplex, Plenum 1.5m	JXF005
OS2 Duplex Patch Cord 2.1m	Ultra Low Loss (ULL) TeraSpeed LC to LC, Fiber Patch Cord, 1.6 mm	UFGLCLC42-
	Duplex, Plenum 2.1m	JXF007
OS2 Duplex Patch Cord 3.0m	Ultra Low Loss (ULL) TeraSpeed LC to LC, Fiber Patch Cord, 1.6 mm	UFGLCLC42-
	Duplex, Plenum 3.0m	JXF010
OS2 Duplex Patch Cord 4.6m	Ultra Low Loss (ULL) TeraSpeed LC to LC, Fiber Patch Cord, 1.6 mm	UFGLCLC42-
	Duplex, Plenum 4.6m	JXF015
OS2 Duplex Patch Cord 6.1m	Ultra Low Loss (ULL) TeraSpeed LC to LC, Fiber Patch Cord, 1.6 mm	UFGLCLC42-
•	Duplex, Plenum 6.1m	JXF020
Category 3, 25 pair count, 1000ft	310 Series Copper Cable, category 3, 25 pair, U/UTP, CMR rated, 1000 ft,	9-57242-1
Cable reel	grey	
Category 3, 50 pair count, 1000ft	310 Series Copper Cable, category 3, 50 pair, U/UTP, CMR rated, 1000 ft	9-57313-1
Cable reel	wooden reel, grey	
Category 3, 100 pair count, 1000ft	310 Series Copper Cable, category 3, 100 pair, U/UTP, CMR rated, 1000 ft	9-57315-1
Cable reel	wooden reel, grey	

<sup>\*</sup> The above list is not intended to be exhaustive of all signal carrying components products required to meet the requirements in the Communications (Division 27) Section of Schedule 1 [Statement of Requirements].

1.3.2 All equipment racks, server cabinets and cable management accessories required in the Facility will be provided from a single manufacturer. The approved manufacturers for these products are Belden, CommScope and Hammond.

Product Name	Product Description	Part Number
BELDEN		
Distribution Rack	Seismic Rated (Zone 4) - 4 Post, 84" Distribution Rack	XDRS8419- 610S02
XHM Seismic Enclosure - Black	Enclosure-Seismic Cabinet 45 Rack Units / 84" H x 24" W x48" D* (*Frame depth 48" / Overall Depth w/doors 51.73")	XH4MS45-1S0005
Vertical Cable Manager	Double Sided High-Density Vertical Cable Manager with doors, 6"W x 84"H.	BHVHH06
Vertical Cable Manager	Double Sided High-Density Vertical Cable Manager with doors, 12"W x 84"H.	BHVHH12
Vertical Cable Manager Backcover	Vertical Manager Backcover, 12"W, black.	BHBC12X
Slack Management Spool Kit	Slack Management Spool Kit, Black. Includes 2 cable spools, mounting channels and mounting hardware.	BHSK020
Horizontal Cable Manager	19" 2U Horizontal Manager with cover.	BHH192UR
Bottom Shelf	Bottom Shelf for 36" Deep 4-post rack	9010-1919-S01
COMMSCOPE		
Vertical Cable Manager	Front & Rear 6" Vertical Mgrs with Door	VCM-DS-84-6
Vertical Cable Manager	Front & Rear 10" Vertical Mgrs with Door	VCM-DS-84-10
Horizontal Cable Manager	19" 2U Horizontal Manager with cover.	HTK-SS-2RU
HAMMOND		
Distribution Rack	Seismic Rated (Zone 4) - 4 Post, 84" Distribution Rack	SR1701650
Bottom Shelf	Bottom Shelf for 36" Deep 4-post rack	SR1702607
Horizontal Cable Manager	19" 2U Horizontal Manager with cover.	RF-HFM2

- 1.3.3 If the Authority's approved manufacturers release products that are superior to the minimum standard products identified in the tables above in terms of performance, throughput, reliability and or physical characteristics then these new products will be provided by the Design-Builder, as directed by the Authority, for this Project at no additional cost; and
- 1.3.4 For other requirements relating to products associated with communications infrastructure, networks and systems, refer to the attached PHSA Communications Infrastructure Standards and Specifications and the Communications (Division 27) Section Schedule 1 [Statement of Requirements].





## COMMUNICATIONS INFRASTRUCTURE STANDARDS & SPECIFICATIONS

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**PUBLIC** 



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#### 27 00 00 INTRODUCTION

#### 1.1 **GOALS**

- The goals of the Communications Infrastructure Standards and Specifications are to .1
  - Provide a communications infrastructure that is capable of meeting current and .1 future operational and clinical needs of the Health Authorities.
  - .2 Functionality, reliability and serviceability of facilities, systems and components.
  - .3 Minimum lifecycle cost of ownership including design, construction, operating and maintenance costs.
  - .4 Flexibility for growth and change.
  - .5 Resource efficiency (energy, materials).
  - .6 Safety and security.
  - .7 Value in facilities and infrastructure investment.
- .2 In the design and installation of a robust healthcare solution, the Communications Infrastructure Standards and Specifications emphasize the importance of:
  - Utilizing best practices for design and deployment of cabling infrastructures. .1
  - Considering the impacts of multiple technologies, networks and cabling systems. .2
  - .3 Addressing how MACs and future cabling upgrades shall be achieved.
  - Considering the type of area and zone density needs (Acute Environments Low, .4 Medium and High per ANSI/TIA-1179-A / Community Environment – Commercial Building ANSI/TIA 568-C) in conjunction with end user functional requirements.
  - .5 Anticipating and accommodating future needs in complex healthcare environments.

#### 1.2 **SCOPE**

- .1 This document serves as the standard of quality and performance for the design and installation of communications infrastructure within healthcare facilities. The document covers the materials, physical components and systems that comprise of all types of Healthcare facilities. The level of quality deemed by any one standard or specification is determined on the basis of achievement of the above noted goals regarding facility functionality, reliability, sustainability, accessibility, safety, security, serviceability and lifecycle cost.
- .2 The document covers:
  - Mandatory minimum standards and specifications. .1
  - .2 Acceptable practices.
  - .3 Common systems and components.
  - Performance and Acceptance criteria. .4
  - 5 Procedural standards.
- .3 There are two categories of healthcare sites identified in the Communications Infrastructure Standards and Specifications - Acute (Hospital) and Community (Assisted Living / Residential Care) Sites

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- .1 In some areas, the application of the standards and specifications will be different depending on whether the site is deemed to be an Acute (Hospital buildings) or Community (Assisted Living, Public Health) site.
- .2 However, determining whether a site's communications infrastructure should be built to an Acute or Community standard is not always clear cut.
- .3 There are a number of sites that fit between the bookends of "Acute" and "Community". Furthermore, the distinction between different kinds of facilities continues to diminish as healthcare sites of all kinds increasingly require robust and redundant IT infrastructures and technologies to improve care and patient outcomes and enable new operating models.
- .4 In these instances, determining how the standard will be applied will always be based on a collaboration between PHSA and key stakeholders in the Health Authorities. Communications Consultants, Professional Engineers, the Builder (Design-Builder or Project Co) or the Communications Contractor will always obtain direction on whether to treat a facility as either an Acute or Community site.
- .5 Examples of Acute or Community sites:
  - .1 All hospital buildings and Health Authorities' owned Outpatient buildings e.g. Jim Pattison Outpatient and Surgical Centre are classified as Acute sites.
  - .2 Community sites are leased spaces located outside the hospitals. Examples of Community sites include but are not limited to the following: Regional Computer Training Space, Primary Care Centre, Hospice, Kidney Dialysis, Assisted Living, Public Health, Home Health, Addiction Treatment Centre, Youth Clinic, Corporate Finance and HR, Health Informatics, Youth Health Centre, Community Outpatient Ambulatory Clinic, Community Outpatient Services, Health Protection Office, MRI Clinic, Friendship Centre Clinic, Sexual Health Clinic, etc.

#### 1.3 APPLICATION AND INTENT

- .1 The standards and specifications apply to all projects involving communications infrastructure.
- .2 Applicable projects include new construction (regardless of delivery method P3, Design-Build, Design-Bid-Build, Construction Management, etc.), renovations, upgrades and cyclical maintenance / renewal work.
- .3 Compliance with these standards and specifications shall be part of all consultant agreements. Specific applicability of the standards and specifications shall be directed to the consultant before fees are submitted. All proposed variances from these standards and specifications must be approved by PHSA Network Edge (NE) Representative throughout all stages of the design and construction.
- .4 The standards and specifications are intended to be used by:
  - .1 Consultants and Professional Engineers.
  - .2 Facilities Management, Maintenance and Operations
  - .3 Suppliers and contractors
- .5 Consultants and Professional Engineers are expected to use these standards and specifications to develop their own Project specific specifications and drawings.

.6 Project Registered Communications Distribution Designer (RCDD)

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- .1 The Lead Project Consultant shall be responsible for providing a BICSI certified RCDD local to the project's location to work with the Health Authorities' representatives as directed.
- .2 The RCDD shall be an expert in all current and applicable codes and standards including but not limited to the current BICSI Telecommunications Distribution Methods Manual (TDMM), and the current PHSA Communications Infrastructure Standards & Specifications. The PHSA Standards shall be the highest authority at all times unless communicated otherwise in specific instances. The RCDD will communicate with the PHSA lead Information and Communications Technology resource on the project for clarification and guidance for all Communications infrastructure items not covered by the PHSA Standards
- .3 The RCDD shall abide by the duties and responsibilities noted in the PHSA Standards and provide services accordingly. Refer to 27 01 00 COMMUNICATIONS SYSTEMS OVERVIEW; Part 1; 1.10 and 1.15 for more information.
- .4 Unless otherwise communicated, all approved drawings issued must bear an official stamp, a signature and the date from the RCDD indicating compliance. The RCDD shall attend milestone meetings with LMFM as determined by the LMFM PM in charge and the supervising Health Authority IT PM and the PHSA Technical Project Manager.
- .7 Contractors that are engaged directly by PHSA shall refer to these standards and specifications for all their installations. Contractors that are engaged directly by Facilities Maintenance and Operations shall refer to these standards and specifications as they relate to connection to the Health Authority's data network for all their installations e.g. BMS, lighting control, access control, CCTV, metering, generator control, elevator, fire alarm, master clock system, nurse call, public address system, and/or any other applications not specifically noted.

**END OF SECTION 27 00 00** 

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#### 27 01 00 COMMUNICATIONS SYSTEMS OVERVIEW

Р	ART 1	GENERAL

#### 1.1 SUMMARY

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- .2 Related Sections
- .3 List of abbreviations
- .4 Introduction
- .5 Overview
- .6 Reference codes and standards
- .7 Application standards
- .8 Approved manufacturers
- .9 Manufacturers
- .10 Contractor qualifications
- .11 Approved Communications contractors
- .12 Warranty
- .13 Manufacturer's cabling system application warranty
- .14 Acceptance conditions
- .15 Communications Consultant

#### 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 05 00 Common Works for Communications Systems
  - .3 Section 27 08 11.01 Fiber Optic Testing
  - .4 Section 27 08 11.02 Copper Testing
  - .5 Section 27 08 11.03 Horizontal Cat6 & Cat6ATesting
  - .6 Section 27 11 00 Communications Room Fittings
  - .7 Section 27 13 13 Copper Backbone Systems

#### 1.3 LIST OF ABBREVIATIONS

- .1 The following abbreviations may be used within this specification document and in the drawings.
  - .1 AHJ: Authority Having Jurisdiction
  - .2 ANSI: American National Standards Institute.
  - .3 ASTM: American Society for Testing and Materials
  - .4 BICSI: Building Industry Consulting Service International
  - .5 CATV: Cable TV
  - .6 CP: Consolidation Point
  - .7 CSA: Canadian Standards Association equipment safety approvals and testing for Canada
  - .8 EF: Entrance Facility
  - .9 EGB: Electrical Ground Breaker
  - .10 ETL: ETL Testing Laboratories product testing laboratory for U.S. and Canada
  - .11 FDC: Fiber Distribution Centre (Fiber splice tray or termination tray)
  - .12 IDF: Intermediate Distribution Frame
  - .13 IEEE: Institute of Electrical and Electronic Engineers

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- .14 ISO: International Standards Organization
- .15 MEGB: Main Electrical Ground Busbar
- .16 NEMA: National Electrical Manufacturer's Association
- .17 TGB: Telecommunications Ground Busbar
- .18 MER: Main Equipment Room (Typical location of Network Core Switches)
- .19 EF: Entrance Facility
- .20 TR: Local Telecommunications Room
- .21 TMGB: Telecommunications Main Ground Busbar
- .22 TO: Telecommunications Outlet
- .23 ULC: Underwriters Laboratories of Canada testing laboratory for Canada (see C-UL and UL)
- .24 UTP: Unshielded Twisted Pair
- .25 WA: Work Area
- .26 NE: Network Edge
- .27 PHSA: BC Clinical Support Society

#### 1.4 INTRODUCTION

- .1 PHSA with few exceptions administers all cabling within healthcare facilities. Network Edge (NE), a department within PHSA's Technology Service's Group, operates, maintains and supports Communications systems and infrastructure.
- The intent of this document is to provide standards and specifications for the implementation and maintenance of the cabling infrastructure systems in new and existing acute and community buildings. Examples of acute sites include hospitals, mental health and outpatient facilities. Examples of non-acute sites include offices, hospices, assisted living, rehabilitation centres and labs. Prior to commencing design, the design team is to engage the PHSA NE Representative to determine the appropriate cabling standard (TIA-1179-A vs. TIA-568D) to apply to the project.
- Any new building shall be opened up for competitive pricing between Commscope and Belden systems for fiber and copper cabling systems. For existing building in a hospital or community site, it shall be opened up for competitive pricing between Commscope and Belden systems for fiber cabling system. For copper cabling system, if the building has standardized on Commscope, then that system shall be implemented. If it has standardized on a Belden system, then that system shall be implemented.
- .4 This document is the property of PHSA NE Department.

#### 1.5 OVERVIEW

- .1 This document must be read, interpreted and coordinated with all other related PHSA technical standards and specifications to deliver a complete Communications infrastructure system.
- .2 These standards and specifications prescribe minimum mandatory requirements for communications infrastructure systems within all buildings, up to and including the Communications outlet, and between buildings to the extent of a region and province wide environment.
- .3 A structured approach is specified which shall ensure a flexible distribution system that shall minimize the future costs of moves, additions and changes.
- .4 The Contractor shall supply, furnish, and install: all material, labour, apparatus, tools, equipment and services required for construction and put into regular operation the complete Communications system, as shown on the Communications Drawings, described in the specifications and any attached appendices.
- .5 Renovations in existing buildings shall always reflect the intent of these standards and specifications.

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Any and all proposed changes to standards and specifications shall be subject to approval in writing to the PHSA NE Representative prior to implementation.

#### 1.6 REFERENCED CODES AND STANDARDS

- .1 Comply with the latest British Columbia Building Code, and Canadian Electrical Code, including all provincial and other amendments, any local by-laws or rules and regulations requirements of Lower Mainland Facilities Management regulating the installation of Communications facilities.
- .2 Provide underground systems in accordance with CSA C22.1-15 edition, except where specified otherwise.
- .3 Equipment and materials shall bear the approval of the Canadian Standards Association and where applicable, the Underwriters Laboratories of Canada or alternately shall bear local approval from the Electrical Inspection Department having jurisdiction. Include in the contract all costs associated with obtaining local approvals.
- .4 If there is a conflict between the Drawings and Specifications and the above noted codes, by-laws, rule and orders, the codes, by-laws, rules and orders shall govern. In no instance, however, shall the standards established by the Contract Documents be reduced by any of these codes or regulations.
- .5 Install and test telecommunications cabling networks as per the latest manufacturer's requirements and in accordance with the following standards: Note: the current ANSI/TIA Standards shall apply:
  - .1 ANSI/TIA Standards.
    - .1 ANSI/TIA-568.0-E-2020 Generic Telecommunications Cabling for Customer Premises standard
    - .2 ANSI/TIA-568.1-E-2020 Commercial Building Telecommunications Infrastructure Standard
    - .3 ANSI/TIA-568.2-D-2018 Balanced Twisted Pair Telecommunications Cabling and Components Standard
    - .4 ANSI/TIA-568.3-D-2016 Optical Fiber Cabling and Components Standard
    - .5 ANSI/TIA-569-E-2019 Commercial Building Standard for Telecommunications Pathways and Spaces
    - ANSI/TIA-606-D-2021 Administration Standard for Commercial Telecommunications Infrastructure
    - .7 ANSI/TIA -607-D-2019 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
    - .8 ANSI/TIA-570-D-2018 Residential Telecommunications Infrastructure Standard
    - .9 ANSI/TIA-758-B-2012 Customer Owned Outside Plant Telecommunications Cabling Standard
    - .10 ANSI/TIA-1179-A-2017 Healthcare Telecommunications Cabling Standard
    - .11 ANSI/TIA-942-B-2022 Telecommunications Infrastructure Standard for Data Centers
    - .12 ANSI/TIA-TSB-162-B-2021 Telecommunications Cabling Guidelines for wireless Access Points
    - .13 ANSI/TIA-862-C-2022, Structured Cabling Infrastructure Standard for Intelligent Building Systems
  - .2 The Canadian Electrical Code Part 1, C22.1-15 edition.
  - .3 BC Amendments to the CEC and associated bulletins.
  - .4 IEEE 802.3 series of Ethernet Standards.
  - .5 IEEE 802.11 series of Wireless Standards.
  - .6 ISO 8802-3 series of Standards.
  - .7 BICSI latest technical manuals:

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- .1 ANSI/BICSI 002-2019, Data Centers Design and Implementation Best Practices
- .2 ANSI/BICSI 003-2014 Building Information Modeling (BIM) Practices for Information Technology Systems
- .3 ANSI/BICSI 004-2018, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
- .4 ANSI/BICSI-006-2020 Distributed Antenna System (DAS) Implementation Best Practices
- .5 ANSI/BICSI 007-2020, Information Communication Technology Design and Implementation Practices for Intelligent Buildings and Premises
- .6 ANSI/BICSI 008-2018, Wireless Local Area Network (WLAN) Systems Design
- .7 ANSI/BICSI N1-2019, Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure
- .8 ANSI/BICSI N2-17, Practices for the Installation of Telecommunications and ICT Cabling Intended to Support Remote Power Applications
- .9 ANSI/BICSI N3-20, Planning and Installation Methods for the Bonding and Grounding of Telecommunication and ICT Systems and Infrastructure
- .10 ANSI/BICSI G1-17, ICT Outside Plant Construction and Installation: General Practices
- .11 Information Technology Systems Installation Methods Manual
- .12 Network Systems and Commissioning (NSC) reference
- .13 Outside Plant Design Reference Manual 6th Edition
- .14 Telecommunications Distribution Methods Manual 14<sup>th</sup> Edition
- .6 If the Contractor notes items in the Division 27 drawings or the specifications that are code violations, promptly bring them to the attention of the Communications Consultant and or the PHSA NE Representative in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.
- .7 Conform to current safety and security standards, codes, and practices in effect at Health Authorities including, but not limited to:
  - .1 Workers Compensation Act Part 3 Occupational Health & Safety.
  - .2 BC Electrical Safety Act.
  - .3 The British Columbia Building Code with Amendments.
- .8 Any other reference material must be approved by PHSA before work commences.
- .9 For installations in an acute hospital setting, if there is conflict between any of the ANSI/TIA or BISCI referenced standards, ANSI/TIA-1179-A takes precedence.

#### 1.7 APPLICATION STANDARDS

.1 The Certified Structured Cabling System shall be guaranteed to operate the applications which the System was originally designed to support, as well as any new applications. New applications are defined as any application introduced in the future by recognized standards organizations or user forums that use the TIA-568-C or ISO/IEC IS 11801 component and link/channel specifications for cabling.

#### 1.8 APPROVED MANUFACTURERS

- .1 All signal carrying components (connectors, cabling, panels, etc.) of the structured cabling systems for telecommunications system provision shall be from a single manufacturer.
- .2 Approved Structured Cabling Products Manufacturer: Refer to 27 01 00 1.4 Introduction.

#### 1.9 MANUFACTURERS

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- .1 All horizontal cable and associated jacks, connectors, patch panels and faceplates shall be manufactured by Commscope or Belden.
- .2 All voice backbone (Riser) cables shall be Category 3; however, termination hardware located in Communications Rooms shall be Category 6.
- .3 All fiber cable shall be manufactured by Commscope or Belden.
- .4 All fiber termination hardware including SM/MM Pigtails shall be manufactured Commscope or Belden.
- .5 All fiber connectors shall be manufactured by Commscope or Belden.

#### 1.10 CONTRACTOR QUALIFICATIONS

- .1 All structured cabling installations must be performed by PHSA prequalified cable contractors.
- .2 Certified Personnel
  - .1 The Contractor shall be an authorized Commscope Partner and/or Belden CSV cabling system Installer.
  - .2 All Technicians performing cable system installation work shall be current Commscope ACT 1 & 2 and/or IBDN-700 certified. All Technician certification cards shall be checked prior to work start up. Technicians must be current employees of the Communications Contractor. No sub-contracting shall be allowed.
  - .3 The Communications Contractor shall assign a Supervisor with current RCDD certification to provide Quality Control based on the "Communications Infrastructure Standards and Specifications," and to provide weekly report to the Communications Consultant and or PHSA NE Representative.
  - .4 The Contractor shall have worked satisfactorily for a minimum of five (5) years on Commscope Partner and/or Belden CSV cabling system.
  - .5 Upon request of the Communications Consultant and or PHSA NE Representative, supply a list of references with specific information regarding type of project and involvement in supplying and installing equipment and systems.

#### 1.11 APPROVED COMMUNICATIONS CONTRACTORS

.1 Refer to PHSA Procurement for the pre-approved list of cabling contractors.

#### 1.12 WARRANTY

- .1 Contractor shall process all warranty requests from the Owner or its agents during the warranty period.
- .2 Warranties shall have certification numbers registering the installation and shall be in the effect starting from the date of Final Acceptance.

#### 1.13 MANUFACTURER'S CABLING SYSTEM APPLICATION WARRANTY

- .1 Warranty of performance for the certified system i.e. the system shall meet or exceed the channel transmission requirements specified by applicable standards (copper and optical fiber).
- .2 Warranty against defects in passive component material and workmanship for a period of twenty-five (25) years from the date of installation. The repair / replacement shall include costs of labor.
- .3 Warranty of the certified systems shall support all industry-standard applications i.e. all Category 6, Category 6A, and singlemode and multimode applications identified in

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current at time of installation; any Category 6, Category 6A, and singlemode and multimode applications introduced at a future date by recognized standards bodies and user forums.

- .4 In the event that the certified system is unable to support an existing or future industry standard application as defined above, and such failure can be attributed to a deficiency in the certified system, the Manufacturer shall provide, at its expense, reasonable expertise, the system materials and labor as required to remedy the problem and/or resolve the claim.
- .5 All cabling products and workmanship must include coverage as follows:
  - .1 System Application Warranty must be provided by the Subject Warranty Manufacturer.
  - .2 System Performance (Component) Warranty Certificate must be provided by the Subject Warranty Manufacturer.
  - .3 The System Application Warranty term must be a minimum of 25 years provided by the Warranty Underwriting Manufacturer, from the date of final acceptance of the project.
  - .4 The name and address of the building/facility and location of site must appear on the warranty document.
  - The contractor must be fully approved and certified by the proposed Warranty Underwriting Manufacturer prior to responding to the bid as a pre-qualification.
  - Testing shall be performed by Telecommunications Technicians who are qualified to perform related tests as required by the manufacturer in accordance with the manufacturer's methods.
  - .7 The original 25 Year Warranty Certificate from the Manufacturer's shall be submitted to the Owner.

#### 1.14 ACCEPTANCE CONDITIONS

- .1 An applications Warranty shall be issued to guarantee to operate the applications which the System was originally designed to support, as well as any new applications. New applications are defined as any application introduced in the future by recognized standards organizations or user forums that use the TIA-568-C or ISO/IEC IS 11801 component and link/channel specifications for cabling.
- .2 Description of System
  - .1 All horizontal cabling shall be either Category 6 or Category 6A as per the requirements identified in the remainder of this document.
  - .2 Voice backbone cabling shall consist of multiples of 25, 50, or 100 pair Category 3 unshielded twisted pair cables and shall be installed from the Main Equipment Room (MER) to each TR Communications Room. The voice riser shall be sized by allocating 50 pairs per 1,000 m² (10,000 ft²). The pair count shall be rounded to the next 25 pair multiple, for Communications Room Zones serving an area greater than 1,000 m² (10,000 ft²).
  - .3 Fiber Data backbone cabling shall consist of OM5 multi-mode and or OS2 singlemode or the latest accepted standard of multimode and single mode optical cables, connectors and patch cables. The Communications Consultant shall be responsible to engage the PHSA NE Representative for instruction on the latest accepted standard of multimode and single mode optical cables, connectors and patch cables to use in the Facility prior to the completion of the project's design phase.
  - .4 OM5 and OS2 single mode optical cable shall be installed from the MER to each zone TR. Strand count and termination type as specified. Minimum strand count per cable shall be 24 strands.

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- .5 Horizontal cable length shall not exceed 80 meters. Horizontal cables for data and/or voice connections to BMS, Lighting control, Access Control, Nurse Call, CCTV, Metering, Generator, Elevator, Fire alarm, Master clock system and/or any other application, systems or devices not specifically noted shall conform to the standards and specifications within this document. Refer to C-STD drawings in 27 00 00.01.).
- The Contractor shall provide equipment rack(s), cabinets, cable management, PDU's and other equipment identified in other areas of this document.
- .7 The Contractor shall finalize equipment layouts of Communications rooms with Communications Consultant and or PHSA NE Representative after award of Contract.
- .8 Communications Pathways c/w Firestop of all penetrations of fire rated barriers (floors and walls).
- .9 Communications Grounding and Bonding
- .10 Installation of wired and wireless hardware and accessories supplied by PHSA. Refer to other sections of this document for exact scope of work.

#### 1.15 COMMUNICATIONS CONSULTANT

- .1 Mandatory minimum qualifying requirements:
  - .1 BICSI Registered Communications Distribution Designer (RCDD) in good standing who has performed minimum 5 years of Communications infrastructure consulting services in Healthcare Industry. If the architectural or engineering firm does not have an RCDD on staff, PHSA shall provide a list of consultants who can contract for the project.
  - .2 Internationally recognized Manufacturer certification programs i.e. Belden and Commscope.
  - .3 Outside Plant / in-premise Backbone Pathway design, 5 years of experience.
  - .4 Wireless design & engineering, 5 years of experience.
  - Low voltage systems' design, 5 years of experience CCTV, CATV, Security, Access Control, Intrusion, DAS Cellular, Satellite Distribution, Nurse Call system, etc.
  - .6 General knowledge of HVAC, Generator and UPS power, Fire Protection, Server Cabinets c/w Seismic Bracing - relating to impact on telecommunications issues & designs.
  - .7 Data Centre design and implementation, 5 years of experience.
  - 8 Knowledge of standards, codes, best design practices including electrical grounding and bonding for telecommunications infrastructure (TIA standard based).
- .2 Communications Consultant Responsibilities:
  - .1 Liaison between Construction Design Team and PHSA NE Representative and the Health Authorities' IMIT Department during the planning, design and construction phases of the project through final construction close-out.
  - .2 Detail information & procedures needed for the uninterrupted service cutover of existing services from old to new cabling systems.
  - .3 Coordinate with other design disciplines. The main areas of coordination are:
    - .1 Architectural Coordinate with the Architect on location, size and critical dimensions of communications rooms and on their construction and finishes.
    - .2 Structural Coordinate with the Structural Engineer on floor loading and seismic bracing of equipment racks and cabinets in Communications rooms, and in boring holes or cutting slots in floors of existing buildings.
    - .3 Mechanical Coordinate with the Mechanical Engineer on environmental control and preferred cooling solutions for communications rooms. Provide

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the Mechanical Engineer with the BTU loads for each communications room considering network and vendor equipment as well as UPS. It is the Communications Consultnat responsibility to work and coordinate with the Mechanical Engineer to identify the location of plenuim spaces. The Mechanical Engineer shall identify the location of the plenum spaces that fall within the scope of the project in the context of existing hospital buildings. These plenum spaces require cabling running through them in open pathways to be FT6 rated. They shall be identified on IT drawings prepared by the project RCDD. Outside of these spaces, FT4 rated cabling is acceptable by code, subject to the AHJ.

- .4 Electrical Coordinate with the Electrical Engineer on electrical services for communications rooms (convenience outlets and rack/cabinet bay power, UPS and lighting)
- .5 Fire Detection and Suppression Coordinate with the Fire Protection Consultant or Engineer on fire detection and suppression system for communications rooms.
- .6 Security Coordinating with the Security Consultant on access control and CCTV coverage for communications rooms as well as the placement of security low voltage equipment within communications rooms..
- .7 Intelligent Building Systems (IBS) Coordinate with all applicable disciplines and with the PHSA NE Representative on the connectivity and integration requirements between the telecommunications or IT systems and the various IBS systems (BMS, Lighting Control, Access Control, CCTV, etc.)
- .4 Design and provide a series of construction specifications based on Construction Specification Institute (CSI) guidelines and detail T-drawings (plans, elevations, sections, risers) based on the latest PHSA Communications Infrastructure Standards and Specifications for review meetings with the PHSA NE Representative at various design stages preliminary, 50%, 95% and final. A typical construction drawing package must include:
  - .1 Floorplans showing the locations of all communications rooms, wiring zones, telecom outlets (identifying the types of outlets and number of cable drops per outlet) and all backbone pathway systems (risers and horizontal pathways) and cabling routes including the routes of the telecommunications grounding backbone.
  - .2 Schematic diagram of the backbone pathway system consisting of riser conduits and sleeves and horizontal conduits, sleeves and cable tray.
  - .3 Schematic diagram of the Telecommunications Grounding System.
  - .4 Schematic diagram of the backbone fiber and copper cabling systems depicting the interconnection between Communications rooms, system components, sub-systems and equipment rack and cabinets.
  - .5 Detail elevation drawings of equipment layout in floor or wall mounted racks and cabinets in communications rooms.
  - .6 Detail plan view communications room layout illustrating the layout of all communications components and equipment and referencing information supplied by other engineering disciplines and consultants such as electrical distribution (panels and receptacles) and lighting fixtures, pathways (sleeves, conduits, entrance ducts, cable tray), grounding, mechanical ducting and equipment, fire detection and suppression systems, security equipment, etc.
  - .7 Elevation drawings of all walls of each Communications room, clearly showing the layout of all termination hardware, grounding & bonding components, horizontal pathway penetrations, and wall mounted equipment cabinets.
  - .8 General and project specific details where necessary (ex. Access floor)

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- .5 For new hospital buildings, the Communications Consultant shall provide design based on ANSI/TIA 1179-A Healthcare Facility telecommunications cabling standard:
  - .1 Low cable density functional area 6 cables;
  - .2 Medium cable density functional area 14 cables;
  - .3 High cable density functional area 15 cables or more as determined in consultation with the Authority; and
  - .4 Any additional cables necessary to support all of the networks, systems and equipment to be installed or used in the Facility.
  - .5 They shall also be based on Communications port requirements signed off by end user and provided by IMIT Project Manager.
- .6 For buildings dedicated to office use, the Communications Consultant shall provide design based on ANSI/TIA 568-C Commercial Building Telecommunications Cabling Standard, and shall be based on two cables per 10 square meters of usable floor area assuming it is 80% of the total gross floor area.
- .7 In administration and clinical areas, for each work area Communications outlet install a minimum of two (2) four-pair Horizontal cables plus IMIT Project Manager functional requirements or as specified. For Wireless Access Point (A/P) locations install two (2) four-pair Horizontal cable from the outlet location to the zone Communications Room (TR). Reception Desk shall be provided with two standard outlets with two cables each.
- .8 Stamp all accepted design prints, material data sheets and shop drawings including but not limited to all outside plant duct banks and cabling, entrance facilities, Communications rooms, equipment rack layout, wall layout, riser diagrams and work area outlets. The stamp shall reference the name of the RCDD, designator number and expiration date. An additional Professional Engineer's stamp may be needed if required by the Authority Having Jurisdiction (AHJ).
- .9 Attend and participate in project meetings.
- .10 Perform installation oversight of telecommunications and low voltage systems including technical analyses and resolution of engineering problems.
- .11 Provide acceptance commissioning of project cabling systems, pathways and spaces.
- .12 Random site inspections, testing of copper and fiber shall be done at the discretion of the Communications Consultant and or the PHSA NE Representative and the Manufacturer Representative to ensure standards are being met. Contractor shall provide all necessary support and any/all requested testing documents. Note: This shall not remove the responsibility of the RCDD to ensure these standards and all Contractors' Quality Control and Quality Assurance processes are met. The Communications Consultant and or the PHSA NE Representative may also request to be present during active testing by the Contractor.
- .13 Ensure all requirements of Communications documents, drawings, addenda, site instructions, change orders and change directives issued are completed in compliance to their instructions.
- .14 Review as-built documentation of communications cabling infrastructure submitted by the cabling contractor and ensure all documentation deficiencies are resolved prior to final submission to the PHSA NE Representative. Refer to Section 27 05 00 for further details on what is typically included within a standard as-built package.
- .15 All AutoCAD infrastructure drawing submissions created by Communications Consultants shall comply with LMFM (Lower Mainland Facilities Management) CAD and CAFM (Computer Aided facilities Management) AutoCAD drawing format and symbol standards. Refer to Appendix D for link to the current LMFM standards.

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#### **END OF SECTION 27 01 00**

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#### 27 01 10 BASIC REQUIREMENTS

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#### 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 Contractor Responsibilities
- .4 Communications Rooms Dust Containment and Access
- .5 Materials
- .6 Drawings
- .7 Acceptance Conditions
- .8 Pre-installation Site Survey

#### **1.2** Related Sections

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 05 00 Common Works for Communications Systems
  - .2 Section 27 08 11.01 Fiber Optic Testing
  - .3 Section 27 08 11.02 Copper Testing
  - .4 Section 27 08 11.03 Horizontal Cat6 & Cat6ATesting
  - .5 Section 27 11 00 Communications Room Fittings
  - .6 Section 27 13 13 Copper Backbone Systems
  - .7 Section 27 13 23 Fiber Backbone Systems
  - .8 Section 27 15 00 Horizontal Cabling
  - .9 Section 27 16 00 Connecting Cords, Devices and Adaptors
  - .10 Section 27 21 33 Data Communications Wireless Access Points

#### 1.3 CONTRACTOR RESPONSIBILITIES

- .1 In the event that the certified system ceases to support the certified application(s), whether at the time of cutover, during normal use or when upgrading, the manufacturer and vendor shall commit to promptly implement corrective action.
- .2 The Contractor shall use qualified service personnel to conduct all maintenance/service work and at any time shall show manufacturer's certification and/or submit references upon request of the Communications Consultant and or PHSA NE Representative.
- .3 The maintenance on site of one complete set of white prints to be used exclusively for purposes of recording changes, deviations and revisions from the original contract. Care shall be taken by directing particular attention to the location of pipes, conduits etc.
- .4 Obtain the cost for as-built CAD fees from the Communications Consultant of Record for the project, and include in the tender price. Contractor shall not provide CAD services.
- .5 Scheduling the Work in a manner acceptable to the Communications Consultant and or the PHSA NE Representative.
- .6 The Contractor has the responsibility to ensure that all provisions of these Standards are met and to specifically advise the Communications Consultant and or the PHSA NE Representative in writing of any contemplated exceptions and obtain approval in writing for these changes.
- .7 The Contractor shall obtain and pay all required permit fees in accordance to all local regulatory bodies.

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- .8 The Communications guideline specifications generally describe the work of the Sub-Contractors, but do not intend to define the responsibility between the General Contractor and its Sub-Contractors.
- .9 The complete scope of all work is fully described in Division 27 drawings and technical specifications described herein.
- .10 The words "provide, "supply", "furnish", and "install" shall imply that the applicable Contractor shall provide all necessary labour, materials, and equipment to complete the installation and where applicable, test same to the approval of the Communications Consultant and or the PHSA NE Representative.
- .11 Unless otherwise noted or specified, the Contractor shall provide all equipment and / or materials shown on the drawings and defined in the specifications.
- Any apparatus, appliances, materials, or work not shown on the drawings, but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be furnished, delivered, and installed by the Contractor, without additional expense to the Owner.
- .13 Establishment and verification of dimensions, elevations, grades, boundaries shown on drawings and, reporting of any errors or inconsistencies to the Communications Consultant and or the PHSA NE Representative before starting Work. Starting Work shall imply that the Contractor has verified all items and found them to be correct. Additional costs arising out of any subsequent rectifications shall be borne by the Contractor.
- .14 The maintenance of discipline and general orderliness of work areas throughout the duration of the Project.
- .15 Take steps to prevent dust from escaping the immediate work zone and from settling on or contaminating communications equipment and terminal hardware, as well as furniture and equipment.
- .16 Contractor shall be responsible to adhere to current Infection Control & Risk Assessment policies as it is related to the installation and construction of the Hospital and include all costs associated with the contractor's installation. Ensure that a minimum of one Foreman has completed CSA approved training on infection control.

#### 1.4 COMMUNICATIONS ROOMS – DUST CONTAINMENT AND ACCESS

- .1 Dust Containment
  - .1 ANSI/TIA-569-C Commercial Building Standard for Telecommunications Pathways and Spaces:
    - .1 To mitigate dust containment, Communications rooms (e.g. main and local telecommunications rooms, exclude data centres which have more stringent requirements) shall not be used as storage areas to store cardboard boxes, ladders and other materials as they tend to accumulate dust particles. This ensures Communications rooms are kept generally clean.
    - .2 Communications rooms shall be protected from contaminants and pollutants that affect the operation and material integrity of the installed equipment and connecting hardware.
    - .3 The Contractor shall effectively protect the Communications rooms, equipment, connecting hardware and materials from dust, dirt and damage during construction.
    - .4 Dust containment measures such as vapour barrier, positive room pressure and absolute filters shall be provided.
    - .5 Precautionary measures shall be taken to ensure dust containment measures taken to protect equipment shall not cause the equipment to overheat.

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- .6 Any dust or particulates that may have resulted from the work shall be mitigated from spreading by placing the nozzle of a vacuum close to the point of drilling, cutting, grinding, sanding and the like that create dust.
- .7 The work area shall be cleaned up and vacuumed on a daily basis. Communications rooms, the outside of equipment racks, cabinets and panels, the inside of power panels, connecting hardware, Communications outlets and the like shall be vacuumed.
- .2 Requirements for Communications Room cleanliness for new construction upon substantial completion
  - .1 Prior to installing any active equipment and components in a Communications Room, the Design-Builder will:
    - Complete a post-construction cleaning of the Communications Room at the sub-micron level, cleaned to ISO 14644-1 Class 8 standard or better, removing all Construction related dust and debris from all surfaces including floors, walls, ceilings, electrical and mechanical equipment, cable trays and equipment racks and all components installed within them.
    - .2 The post construction cleaning will be done professionally by a company that is specialized in cleaning critical environments. The Design-Builder must submit for the Authority's approval information related to the company's experience, references, techniques, tools and the proposed contracted scope of work detailing what will be included in the post-construction clean. If the information does not satisfy the Authority's acceptance criteria, then the Design-Builder must re-submit information until the Authority grants its approval.
  - .2 Conduct air quality testing and provide the Authority with a report and analysis of particle counts before and after the post-construction cleaning of a Communications Room; and
  - .3 The Design-Builder will supply and install clean room sticky mats, booties, curtains and plastic strip doors and air scrubbers as long as required to maintain the required air quality and keep the room clean until substantial completion of the facility is achieved.
- .3 Access and other Conditions
  - .1 For access to Communications rooms, contact Facilities Maintenance and Operations (FMO) or a PHSA NE Representative.
  - .2 Communications room door shall be kept closed at all times for cooling, infection control and security reasons.
  - .3 No Food or beverages of any type.
  - .4 No Cardboard of any type.
  - .5 No Styrofoam or packing material.
  - .6 No wood pallets.
  - .7 Shoes must be clean before entering the room.
  - .8 All un-authorized people must have prior approval from Building Owner (Health Authority, FMOor Landlord), notify PHSA NE, and be granted access by FMO before entering Communications rooms.
  - .9 All people entering the Communications rooms must sign in and out with FMO.
  - .10 Vendors/Contractors must display ID at all times.
  - .11 Equipment cannot be added or removed from the Heath Authority's network racks unless specifically stated within the project's scope of work or authorized by a PHSA NE Representative. This includes power cables, network cables and fiber cables. This requirement excludes 3<sup>rd</sup> party vendor shared rack.

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.12 Failure to comply with these rules shall result in the removal of access to the Communications rooms.

#### 1.5 MATERIALS

- .1 Materials not approved or not conforming to the Contract Documents shall be rejected
- .2 The Contractor shall identify materials with long delivery times immediately upon submittal of shop drawings and shall order such materials as soon the shop drawings are approved by the Communications Consultant and or the PHSA NE Representative
- .3 Materials shall be delivered on site in original containers and packages with labels and seals intact. Use in strict accordance with manufacturer's latest printed directions and instructions unless otherwise specified.
- Material deliveries to the site shall be the responsibility of the Contractor. After delivery, the Contractor shall take responsibility to protect material during storage and handling to prevent damage and theft. Do not store equipment or materials where conditions fall outside manufacturer's recommendations for environmental conditions. Do not install damaged material or equipment. Material or equipment damaged during installation shall be replaced.

#### 1.6 DRAWINGS

- .1 The location of various items indicated in T drawings, are approximate except where specifically mentioned.
- .2 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work.
- .3 The Contractor is responsible to take field measurements where equipment and material dimensions are dependent upon building dimensions.
- .4 The Contractor shall coordinate with General, Mechanical and Electrical trades as well as Furniture Layout Designer for final user outlet locations.
- .5 If any discrepancies or omissions are found in the drawings, or if the intent is not clear, the Contractor shall obtain clarification from the Communications Consultant and or the PHSA NE Representative.

#### 1.7 ACCEPTANCE CONDITIONS

.1 The installed system shall be deemed acceptable when the Contractor meets the conditions specified in Section 27 05 00 of this document.

#### 1.8 PRE-INSTALLATION SITE SURVEY

- .1 Prior to start of systems installation, the Contractor shall meet at the project site with the Communications Consultant and or the PHSA NE Representative and Representatives of trades performing related work to co-ordinate efforts.
- .2 The Contractor shall review areas of potential interference and resolve conflicts before proceeding with the work. Facilitation with other trades shall be necessary to meet critical deadlines for completion of Communications Rooms and Closets.
- .3 Examine areas and conditions under which the system is to be installed. Do not proceed with the work until satisfactory conditions have been achieved.

#### **END OF SECTION 27 01 10**

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# **27 05 00 COMMON WORKS**

PART 1	GENERAL
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# 1.1 SUMMARY

.1 Summar	y
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- .2 Related Sections
- .3 Contract Drawings and Specifications
- .4 Shop Drawings, Submittals and Construction Documents
- .5 Review and Approval
- .6 Contractor's Foreman
- .7 Project Meetings
- .8 Coordination on Site
- .9 Sequence and Scheduling
- .10 Pricing
- .11 Permits, Fees, Taxes and Inspections
- .12 Coordination, Clarifications and Addenda
- .13 Inspections
- .14 Substantial Performance
- .15 Certification of a Communications System

# 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 08 11.01 Fiber Optic Testing
  - .3 Section 27 08 11.02 Copper Testing
  - .4 Section 27 08 11.03 Horizontal Cat6 & Cat6ATesting
  - .5 Section 27 11 00 Communications Room Fittings
  - .6 Section 27 13 13 Copper Backbone Systems
  - .7 Section 27 13 23 Fiber Backbone Systems
  - .8 Section 27 15 00 Horizontal Cabling
  - .9 Section 27 16 00 Connecting Cords, Devices and Adaptors
  - .10 Section 27 21 33 Data Communications Wireless Access Points

# 1.3 CONTRACT DRAWINGS AND SPECIFICATIONS

- .1 The Contract drawings and specifications form an integral part of the contract documents. Neither the drawings nor the specifications shall be used alone. Work omitted from the drawings but mentioned or reasonably implied in the specifications, or vice versa, shall be considered as properly and sufficiently specified and shall be provided.
- .2 Misinterpretation of any requirements on drawings, or specifications shall not relieve the Contractor of his or her responsibility of properly completing the Contract.
- .3 Where conflict exists between drawings and specifications, the Contractor shall make allowance for provision of the component, system, or installation process in a manner which shall provide PHSA with the highest monetary cost components, systems, or installation process.
- .4 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of the Work. The Contractor shall not scale the drawings, but rather take

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- field measurements particularly where equipment and material dimensions are dependent on building dimensions.
- .5 The Contractor shall obtain information from the Communications Consultant and or the NE Representative where exact communications outlet locations are not indicated, but are specified on the plans and or specifications.
- .6 The Communications Consultant and or the PHSA NE Representative has the option of changing the location of Communications outlets to within 3 meters of designed location prior to rough-in stage at no extra cost to the Owner.

# 1.4 SHOP DRAWINGS, SUBMITTALS AND CONSTRUCTION DOCUMENTS

- .1 The Contractor shall submit to the Communications Consultant and or the PHSA NE Representative for approval all product data (including cut sheets and catalogue information) and shop drawings on the complete bill of materials for the project noting long lead-time items and providing samples and mock-ups if required by the Contract Documents.
- .2 An indexed master parts list for all items included in the shop drawings shall be provided, and showing the page number relating to all the part numbers before the Communications Consultant and/or the PHSA NE Representative can review the shop drawings. Example:

  Table of Contents

Description	Manufacturer	Part Number	Page Number
Belden Seismic 4 Post Rack 84"X19"	Belden	XDRS8419-610S02	Page 3
Rack Bottom Shelf, Solid 19"EIA X 19"Deep	Belden	9010-1919-S01	Page 3
Vertical Cable Management Kit, 10in X 84in,	CommScope	760072801	Page 3
Double Sided with Doors, Silver		VCM-DS-84-10	

- .3 The Contractor shall submit a sample binder and contents of the Manual of Operations for approval at time of shop drawings submission. Refer to Substantial Performance for further details.
- .4 The Contractor shall also present the following submittals to the Communications Consultant and or the PHSA NE Representative for review and approval:
  - .1 Manufacturer's catalogue sheets and specifications for fiber optic field-test instruments including optical loss test sets (OLTS; power meter and source), optical time domain reflectometer (OTDR) and inspection scope.
  - .2 Sample test reports.
  - .3 Field-directed changes to cross connect and patching schedule.
  - .4 Backbone cable routing or location changes.
  - .5 Fire-stop design, identifying all locations to be fire-stopped, complete with documentation, a list of all fire-stopping materials to be used, and fire-stop systems to be installed.
- .5 All above submittals must be forwarded promptly and in such sequence as to cause no delay in the work or in the activities of the other trades.
- .6 The Communications Consultant and or the PHSA NE Representative shall indicate approval of shop drawings, product data, and samples submitted by stamping such submittals with the word: "APPROVED".
- .7 Submitted shop drawings shall be signed by the Contractor, imprinted with the date submitted, and shall bear the Contractor's legitimate Company name.
- .8 By submitting shop drawings, product data, and samples, the Contractor signifies that he, or she has carefully reviewed and verified materials, quantities, field measurements, and related field construction criteria. It also signifies the Contractor has checked, coordinated, and verified that all information contained in shop drawings, product data, and samples conforms to the requirements of the Work and of the Contract Documents.

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- .9 The Contractor shall perform no portion of the Work requiring submittal and review of shop drawings, product data, or samples until the Communications Consultant and or the PHSA NE Representative has approved the respective submittal.
- .10 The Contractor shall submit shop drawings, product data, and samples to the Communications Consultant and or the PHSA NE Representative as a complete set within fifteen (15) working days subsequent to Award of Contract and prior to start of Work.
  - .1 For initial and re-submission for approval, the Contractor shall submit a soft copy of the proposal that is electronically stamped to the Communications Consultant and or the PHSA NE Representative.
  - .2 The Communications Consultant and or the PHSA NE Representative shall only return one copy of each submission.
  - .3 The Contractor shall make reproductions as required for his or her own use and distribution to subcontractors.
  - .4 The Contractor shall highlight relevant products on the shop drawings.
  - .5 The Communications Consultant and or the PHSA NE Representative shall not accept illegible submittals.
- .11 The Communications Consultant shall provide one copy of each submittal to PHSA NE Representative for review and approval.

## 1.5 REVIEW AND APPROVAL

- .1 The Communications Consultant's and or the PHSA NE Representative's approval of the Contractor's shop drawings, product data, and samples submitted shall not relieve the Contractor of responsibility for errors, omissions, or deviations from requirements of the Contract Documents, unless the Contractor has specifically informed the Communications Consultant and or the PHSA NE Representative in writing of such deviation at time of submittal. The Contractor shall also receive written approval of the specific deviation from the Communications Consultant and or the PHSA NE Representative.
- .2 The Communications Consultant's and or the PHSA NE Representative's review and approval of shop drawings, product data, and samples, is for the limited purpose of checking for conformance with information given and design concept expressed in the Contract Documents.
- .3 The Communications Consultant's and or the PHSA NE Representative's review of Contractor's submittals is not conducted for the purpose of determining accuracy and completeness of details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor.
- .4 The Communications Consultant's and or the PHSA NE Representative's review shall not constitute approval of safety precautions or of construction means, methods, techniques, sequences or procedures.
- .5 The Communications Consultant's and or the PHSA NE Representative's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

## 1.6 CONTRACTOR'S FOREMAN

- .1 The Contractor shall designate a Foreman to remain on the job site from the time construction commences until final completion and acceptance of the Work
- .2 The Foreman shall not be changed unless satisfactory reasons are given in writing to the Communications Consultant and or the PHSA NE Representative.

# 1.7 PROJECT MEETINGS

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.1 The Cabling Contractor's Project Manager and Foreman shall attend all meetings with the General, Mechanical, and Electrical Contractors as requested, as well as meetings that may be requested by the Communications Consultant and or the PHSA NE Representative.

## 1.8 COORDINATION ON SITE

- .1 The Cabling Contractor shall coordinate his work with the General, Mechanical, and Electrical Contractors to ensure that all required supporting structures, such as wall plywood, conduits, trays and cable dropouts, are in place prior to commencing work.
- .2 Any conduit, outlet boxes, J-hooks, cable trays or cable dropouts that are installed at locations that contradict instructions on the drawings or in the specifications shall be immediately identified and reported to the Communications Consultant and or the PHSA NE Representative.
- .3 The Contractor shall promptly advise the Communications Consultant and or the PHSA NE Representative of any specific equipment, materials or installation that are non-conforming with or in violation of laws, by-laws or regulations of authorities having jurisdiction.

## 1.9 SEQUENCE AND SCHEDULING

- .1 The Contractor shall submit a complete Construction Schedule for the installation of equipment (if specified), and cabling within fifteen (15) working days of Awarding of Contract.
- .2 The Construction Schedule shall indicate delivery, installation, and testing dates for each component of the project. A typical project schedule submitted by the Contractor shall provide the following key milestone dates:
  - .1 Contract Award.
  - .2 Submittal and Approval of Shop Drawings
  - .3 Key Material Procurement Dates
  - .4 Horizontal Cabling
    - .1 Cable Rough-in
    - .2 Firestopping
    - .3 Cable Termination
    - .4 Testina
    - .5 Labelling
  - .5 Backbone Cabling
    - .1 Cable Rough-in
    - .2 Firestopping
    - .3 Cable Termination
    - .4 Testing
    - .5 Labelling
  - .6 Telecommunication Grounding Backbone
    - .1 Bonding Conductor Rough-in
    - .2 Busbar Installation
    - .3 Bonding Conductor Termination
    - .4 Labelling
  - .7 Communications Room Make Ready
    - .1 Racks/Cabinets/Cable Management Installed
    - .2 Grounding and Bonding Complete
    - .3 Cable Termination Equipment Installed

.4 Labelling

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- .5 Final (Equipment Ready) Clean
- .8 Equipment Installation Dates
- .9 Submission of As-Built Documentation Package
- .10 Substantial Performance.
- .11 Communications Consultant and or the PHSA NE Representative Acceptance.
- .3 The Contractor shall ensure their schedule aligns to and is coordinated with the General Contractor's overall construction schedule as well as the schedules of other sub-trades (electrical, mechanical, etc.), PHSA and other third parties whose tasks impact either the start and/or completion of the Contractor's tasks.
- .4 The Contractor shall submit a separate demolition time schedule with applicable cut-over in areas that have existing users. This applies to any areas where systems shall need to be taken off-line.

## 1.10 PRICING

.1 The Contractor shall provide all separate, alternate and unit pricing as specified in this or any other documents relevant to this project.

# 1.11 PERMITS, FEES, TAXES AND INSPECTIONS

- .1 Contractor is fully responsible for compliance with Federal, Provincial and Municipal laws and regulations.
- .2 Prior to the start of the project, the Contractor shall obtain a low voltage permit. As well, at the end of the project the Contractor shall submit a request for final inspection to the Authority Having Jurisdiction (AHJ).
- .3 The AHJ is responsible for issuing electrical permits.
- .4 The Contractor shall pay all associated inspection fees.
- .5 The Contractor shall be responsible and pay for any additional time and expense occurred if re-inspections are required for deficiencies, which have not been corrected to the Owner's satisfaction.
- .6 The Contractor shall pay for all associated taxes.
- .7 Contractor shall obtain and pay for all necessary key deposits, permits and licenses.
- .8 Prior to commencement of work, the Contractor shall provide a copy of all permits to the Communications Consultant and or the PHSA NE Representative.
- .9 The Communications Consultant shall provide drawings and specifications if required by the AHJ. All costs associated with this requirement shall be included in the Communications Consultant's fee proposal.
- .10 The Communications Consultant shall be required to notify the PHSA NE Representative of changes required by the AHJ prior to making changes.
- .11 Upon substantial performance and before final payment, the Contractor shall submit a confirmation copy of acceptance for all work, issued by the AHJ, to the Communications Consultant and or the PHSA NE Representative.

# 1.12 COORDINATION, CLARIFICATIONS AND ADDENDA

- .1 Questions about the meaning and intent of this document that may require clarification shall be submitted to the Communications Consultant and or the PHSA NE Representative.
- .2 Replies to tender questions shall be issued in writing in the form of Addendum. Replies or modifications made in any other manner shall not be binding and have no legal effect.
- .3 Addenda issued by the Communications Consultant during the tender period shall be incorporated into Contractor's response, shall become part of the contract documents, and shall be reflected in the Contractor's price.

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.4 Site Instructions and Change Orders shall be incorporated into the installation drawings.

#### 1.13 INSPECTIONS

- .1 The Contractor shall request and coordinate representation from the Communications Consultant and or the PHSA NE Representative for inspection of cabling system during, but not limited to the following stages of construction:
  - .1 Communications room construction
    - .1 Wall layout of various low voltage systems, entrance copper cables, grounding system, system panels, connecting hardware and GigaBIX wall.
    - .2 Floor layout of equipment racks and double-sided finger-type vertical cable managers on both sides of each rack (double-sided means 152mm -305mm wide x 254mm deep front channel for patch cables and 152mm -305mm wide x 254mm deep rear channel for horizontal cables).
    - .3 Ceiling layout of cable tray, and cable dropouts over side of tray (clip-on Cablofil 115mm deep) into vertical cable managers and GigaBIX wall. This is to provide unrestricted access of cables from the tray into the vertical managers. Cutting of tray at the bottom is prohibited.
    - .4 Proper positioning of lighting and mechanical ducting layout in relation to ceiling tray, racks and sprinkler head.
    - .5 Layout of equipment on racks horizontal cable manager, fiber patch panels, analog voice patch panels, horizontal cable patch panels in relation to switches, etc.
  - .2 Cable rough-in, dressing and termination (workmanship).
  - .3 Labelling.
  - .4 Testing and documentation.
  - .5 Old cable removal and clean up.
  - .6 Completion and acceptance.

# 1.14 SUBSTANTIAL PERFORMANCE

- .1 The Contractor shall advise the Communications Consultant and or the PHSA NE Representative in writing when Substantial Performance has been achieved. At the same time, the Contractor shall request a Deficiencies Inspection to be made.
- .2 The Contractor shall not issue Substantial Performance and a Deficiencies Inspection request until the following work has been completed and specified documentation forwarded to Communications Consultant and or the PHSA NE Representative:
  - .1 As-built record (soft copy) documentation has been provided.
  - .2 All systems have been tested and are ready for operation.
  - .3 Record of completed verification of Communications system has been provided.
  - .4 Fire-stop installation is performed as per Fire-stop Section 27 05 29.
  - .5 The clean-up is finished in all respects.
  - .6 All inspection certificates have been furnished including final low voltage and or Electrical inspection certificate.
- .3 At Substantial Performance, the Contractor shall submit drafts in soft copy soft of the following to the Communications Consultant:
  - .1 As-Built drawings.
  - .2 Maintenance Manual
- .4 As-built drawing package shall confirm location and identification of all:
  - .1 Communications Outlets and jack numbers with serving Communications Room ID.

.2 Communications Rooms.

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- .3 Communications Room boundary lines
- .4 Backbone Cable Runs.
- .5 Communications Room floor and ceiling layouts (rack, GigaBIX wall, wall-mount system panels, vertical & horizontal conduit sleeves, ceiling tray, etc.).
- .6 Fiber, Copper and Grounding schematics.
- .5 The Maintenance Manual shall typically contain the following:
  - .1 Set of final reviewed Shop Drawings.
  - .2 A copy of all as-built drawings
  - .3 Digital photos of all Communications rooms showing each wall and rack elevations
  - .4 Circuit Spreadsheets for horizontal cabling and fiber backbone (refer to Appendix A)
  - .5 Manufacturer Warranty documents for equipment and workmanship.
  - .6 Copper Warranty Certification test result printouts.
  - .7 Optical fiber power meter/light source test result printouts.
  - .8 Fire-stop design and records documentation as per section 27 05 29.
  - .9 Names, addresses, phone numbers and facsimile numbers of Contractor, Communications Consultant, sub-contractors and suppliers used on the Work together with a specification reference of the portion of the Work they undertook.
- .6 Upon completion of the project to the Owner's satisfaction, the Contractor shall submit final documentation consisting of:
  - .1 Full size set of As-Built drawings
  - .2 (3) USB Memory Keys of As-Built drawings. As-Built Drawings are to be provided in:
    - .1 AutoCad 2015 (bind all x-Refs files)
    - .2 PDF (all files combined into a single document)
  - .3 Maintenance Manual in a hard back D-ring commercial binder.
    - .1 Maintenance Manual shall be in a suitably labelled, hard back, D-Ring type commercial binders, each complete with an index and tabbed title sheets for each section. All binder pages shall have self-adhesive reinforcing rings at each binder ring.
    - .2 All maintenance manual data shall be printed on 8 1/2" x 11" heavy bond, indexed, tabbed, punched and bound in the binders. Drawings shall be printed on 11" x 17". Each manual shall have a title sheet which is labelled "Operation & Maintenance Manual", and shall list the Project name, Contractor's & Communications Consultant's names, date submitted, and a Table of Contents for each volume. If a manual exceeds 75 mm in thickness, provide additional manuals as required.
  - .4 Soft copy of the Maintenance Manual in PDF format on a separate USB Memory Kev
- .7 The Communications Consultant shall distribute the final project documents to the following departments:
  - .1 Full size set of As-Built drawings to the site Facilities, Maintenance and Operations (FMO) team.
  - .2 USB Memory Key of As-Built drawings to FM Support.
  - .3 USB Memory Key of As-Built drawings to the site FMO team.
  - .4 USB Memory Key of As-Built drawings to the PHSA Network Edge Department.
  - .5 Maintenance Manual in a hard back D-ring commercial binder to the site FMO team.
  - .6 Soft copy of the Maintenance Manual in PDF format on a separate USB Memory Key to the PHSA Network Edge Department.

# 1.15 CERTIFICATION OF A COMMUNICATIONS SYSTEM

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- .1 The Contractor shall ensure that the installed cabling system and the Contractor's Employees working on this project are Certified and Warrantied by the Cable Manufacturer.
- .2 The Contractor shall only use Certified Personnel who are trained and equipped to properly install a structured cabling system, including but not limited to supporting pathways, cable, termination hardware, bonding and grounding system, equipment cabinets or equivalent, and associated Communications equipment, in order to obtain system acceptance.

**END OF SECTION 27 05 00** 

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# 27 05 26 GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

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# 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 References
- .4 Statutory Authority Electrical Safety
- .5 Definitions
- .6 System Description

#### 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 08 11.01 Fiber Optic Testing
  - .2 Section 27 08 11.02 Copper Testing
  - .3 Section 27 08 11.03 Horizontal Cat6 & Cat6ATesting
  - .4 Section 27 11 00 Communications Room Fittings
  - .5 Section 27 13 13 Copper Backbone Systems
  - .6 Section 27 13 23 Fiber Backbone Systems
  - .7 Section 27 15 00 Horizontal Cabling
  - .8 Section 27 16 00 Connecting Cords, Devices and Adaptors
  - .9 Section 27 21 33 Data Communications Wireless Access Points

# 1.3 REFERENCES

- .1 CEC, CSA C22.1-15 "Canadian Electrical Code" Part 1
- .2 ANSI/TIA J-STD-607-C-2015 standard

# 1.4 STATUTORY AUTHORITY – ELECTRICAL SAFETY

- .1 Canadian Electrical Code, Part 1, Twenty-third Edition.
- .2 Safety Standard for Electrical Installations.
- .3 Canadian Standards Association Standard C22.1-15 is adopted in whole, including any errata and with the changes set out in schedule, as the B.C. Electrical Code Regulation, is in force.

#### 1.5 DEFINITIONS

- .1 Define the following list of terms, as used in this specifications as follows:
  - .1 "CM": Circular Mil.
  - .2 "MBRGB": Main Building Reference Grounding Busbar.
  - .3 "TBB": Telecommunications Bonding Backbone.
  - .4 "TBC": Telecommunications Bonding Conductor.
  - .5 "TGB": Telecommunications Grounding Busbar.
  - .6 "TMGB": Telecommunications Main Grounding Busbar.

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# 1.6 SYSTEM DESCRIPTION

- .1 Telecommunications Grounding as described C-STD drawings in 27 00 00.01 are to be referred to as a minimum requirement using a dedicated ground, this applies to all new and any existing communications spaces.
- .2 The types of components connected to the Telecommunications Grounding and Bonding System include but are not limited to cable tray, interlocking armoured backbone cable, equipment racks, server cabinets, active network equipment, electrical panels, cable protectors, conduit and any exposed metal inside a Communications room.
- .3 The Telecommunications Grounding Backbone system contains grounding bus bars, ground bar conductors, and connecting devices (including but not limited to compression lugs, taps, ground bushings, clamps, or exothermic welds). These components provide a low impedance path to ground for stray voltages or spurious signals present on telecommunications media and equipment.
- .4 Grounding and bonding practices shall comply with all applicable codes.

#### PART 2 PRODUCTS

## 2.1 GROUNDING & BONDING CONDUCTORS

- .1 TBB
  - .1 Conductor: Class I stranded copper.
  - .2 Insulation: Flex EPR/Hypalon LS, green in colour.
  - .3 The cable shall have the insulation grade, the conductor gauge, and applicable UL jacket listings printed on the insulation.
  - Where conductors with green insulation are not commercially available, provide a minimum of 100 mm long colour band with green, non-aging, plastic tape in accordance with CEC. This band shall occur at both ends of the conductor, and at all connections between.
  - .5 Gauge: #4/0.
- .2 TBC:
  - .1 Conductor: Class I stranded copper.
  - .2 Insulation: Flex EPR/Hypalon LS, green in colour. The cable shall have the insulation grade, the conductor gauge, and applicable UL jacket listings printed on the insulation.
  - .3 Gauge: #6 AWG for racks and cabinets, armoured fiber optic cable, metallic jacket of inter-building cables, and entrance cable surge protector. As there are different TBC sizes for different connections, the TBC sizes for the following items shall be based on the AHJ: electrical panels inside Communications spaces (minimum #1 AWG), exposed structural steel (minimum #2/0), entrance conduits, metallic backbone riser conduits, cable tray, Wiremold raceway (typically #12 AWG), etc. Project specification needs to ensure it is comprehensive about the connector types relative to the scope of work.
- .3 Bonding conductor shall be green jacketed, stranded copper, soft conductor, unless otherwise noted (bare #6 AWG. for cable tray). Unless installed in conduit system, bonding conductor jacket shall be CMR/P rated as required by the AHJ.
- .4 All bonding conductors and connectors shall be approved as defined in CSA C22.1-15.

# 2.2 GROUNDING BUSBARS

.1 TMGB

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- .1 Material: Copper and tin-plated
- .2 Minimum dimension of 100 mm wide X 305 mm long X 6 mm thick.
- .3 Holes: Predrilled, with standard NEMA bolt hole sizing & spacing for this type of connectors used.
- .4 Mounting: Utilize insulated standoffs.
- .5 Manufacturer: Panduit or Erico. Panduit GB4B0612TPI-1 (minor construction or renovation project). Panduit GB4B0624TPI-1 (major construction or renovation project).

# .2 TGB

- .1 Material: Copper and tin-plated
- .2 Minimum dimension of 50 mm wide X 305 mm long X 6 mm thick. 100 mm wide X 610 mm long X 6 mm thick (major construction e.g. Acute Tower, or major renovation project e.g. Acute redevelopment).
- .3 Holes: Predrilled, with standard NEMA bolt hole sizing & spacing for the type of connectors used.
- .4 Mounting: Utilize insulated standoffs.
- .5 Manufacturer: Panduit or Erico. Panduit GB2B0306TPI-1.

# 2.3 CONNECTORS

- .1 General: All connectors shall be UL listed.
- .2 Connectors shall be intended for the application.
- Typical connectors: H-tap (for TBB), C-tap, Two-hole compression lug (for TMGB and TGB), split-bolt Burndy, post Burndy, and ground bushings.

# PART 3 EXECUTION

#### 3.1 GENERAL

.1 Install a complete, permanent, and continuous bonding and grounding system for Communications infrastructure and, equipment including all necessary conductors, connectors and accessories, as indicated on drawings and this document, in order to conform to requirements of Electrical Inspection Department and Canadian Electrical Code.

#### 3.2 IDENTIFICATION

.1 Refer to Section 27 05 53 Identification for Communications Systems for labelling requirements.

# 3.3 GROUNDING & BONDING CONDUCTORS

- .1 Bonding conductors placed in metallic conduits longer than one metre must be bonded at each end of the conduit with the appropriate bonding bushing.
- .2 Where the Communications rooms are stacked, the bonding conductor shall be a common riser bonding conductor for connection to the stacked Communications rooms.
- .3 Where practicable, all bonding conductors shall be installed without a splice. Where a splice is necessary, it shall be accessible and located within a Communications room.

  Conductors shall be spliced using irreversible compression-type connectors, exothermic welding, or equivalent. All joints shall be adequately supported and protected.

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- .4 Bonding conductors shall be as short as possible and routed with a minimum of bends.
  All bends made on the conductor shall be sweeping bends. Minimum bending radius is
  200 mm (8") bonding conductors shall be fixed to the walls and neatly formed around the
  perimeter of the room.
- .5 Install a bare #6 AWG copper stranded conductor, in the entire length of surface raceway or cable tray and bond to the telecommunications grounding system.
- .6 The cable tray bonding conductor shall be bonded to cable tray by a bonding clamp at each straight length of tray regardless of length and each elbow and T-fittings.
- .7 All splices of bonding conductors shall be outside of the cable trays.
- .8 Conduits for individual outlets shall be bonded using a #12 AWG stranded insulated copper conductor from the conduit bonding bushing to the cable tray bonding conductor.
- .9 The metallic jacket of all inter-building cables shall be bonded with a #6 AWG green PVC jacketed stranded copper conductor at the jacket opening at both ends of the cable, using a bonding clamp designed for the cable used.
- .10 The metallic jacket of metallic shielded & interlocking armoured backbone cables shall be bonded with a #6 AWG green jacketed stranded copper conductor at the jacket opening at both ends of the cable, using a Grounding Bushing on an armoured cable connector designed for the cable being used.
- .11 Metallic cable protectors shall be bonded with a #6 AWG green jacketed stranded copper bonding conductor.
- .12 Equipment racks and Communications equipment shall be bonded with a #6 AWG green. Each rack shall be bonded with a #6 AWG green directly to the TMGB or TGB (starwired).
- .13 Metal parts in the Communications rooms shall be bonded to the appropriate ground busbar.
- .14 Power panels in Communications rooms shall be bonded to the TMGB or TGB with ground cable sized as per the requirements of the CEC.
- .15 All Communications EMT conduit and tray leaving the Communications room shall be bonded.
- .16 Bond the metal frame of the building to the TMGB/TGB; cable sized as per the CEC.
- .17 All Communications outlet boxes shall be bonded.
- .18 Install #12 AWG insulated stranded copper bonding conductor to metal Wiremold surface raceway, and bond to the building and telecommunications grounding systems for joint-use power and Communications applications. Bond to telecommunications grounding system if the raceway is dedicated only for Communications use.
- .19 Protect exposed bonding conductors from mechanical damage.

## 3.4 GROUNDING BUSBARS

- .1 The TMGB shall be connected to the building main Electrical ground busbar with a #4/0 AWG green jacketed stranded copper conductor.
- .2 The size of the TBB is a minimum size of 4/0 AWG.
- .3 All TGB's shall be connected to the TMGB with a minimum #4/0 AWG green jacketed copper conductor FT rated as per the AHJ or installed in conduit.
- .4 A grounding busbar shall be placed below the ceiling cable tray at 2300 mm AFF near the corner of the wall that adjoins another wall where the conduit sleeves are located. It shall be mounted to the wall with insulating stand-offs.

## 3.5 CONNECTORS

- .1 All connections to the TBB shall be accessible and located in a Communications room.
- .2 Bonding connections shall be made with paint-piercing washers, dual bolts, triple crimp connectors, clamps, or lugs specifically designed for the purpose.

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- A lug shall be crimped to each end of the bonding conductor. Bonding conductors shall .3 be bolted on the appropriate ground busbar with a 6 mm copper alloy bolts and nuts.
- .4 Leave 6 spare connectors in the MER Communications Room and 4 spare connectors in each TR Communications Room.
- Prior to attaching a lug to a painted or galvanized surface, the paint shall be scraped off .5 to bare metal, to provide maximum contact. Paint-piercing washers and lock washers shall be used with the bolts.
- Install two-hole connectors in accordance with manufacturer's instructions .6
- Compression Taps: .7
  - .1 TBB shall bond the TMGB with each TGB (star configuration – individual TBBs) or
  - .2 TBB shall bond the TMGB to the farthest TGB (riser configuration – one main TBB where TGBs between TMGB and farthest TGB are tapped off).
- .8 General: Compression taps shall be used as a connection device from TBCs (from the TGB) to the TBB.
  - .1 "H" compression tap for #6 AWG bonding conductor to a 4/0 TBB, or approved equivalent.
- .9 Compression Connectors (Lugs)
  - General: Compression connectors shall be used as a connection device from TBCs
  - .2 Copper lug for #6 AWG conductor, with two 6 mm bolt holes, or approved equivalent.
  - .3 Copper lug for 4/0 AWG conductor, with two 8 mm bolt holes, or approved equivalent.
- .10 Connections to Conduits
  - Entrance Conduits: For connecting bonding conductor to all 103 mm rigid steel entrance conduits, use threaded insulated throat grounding bushings. Manufacturers:
- .11 Connections to Busbar
  - General: Compression connectors shall be used as a connection device for TBC to TGBs.
    - Standard barrel copper lug for #6 AWG conductor, with two 6 mm bolt hole. .1
    - Standard barrel copper lug for 4/0 AWG conductor, with two 8 mm bolt .2 holes.
    - .3 Two 8 mm lugholes, for all conductors between #4 AWG to 4/0 AWG conductors.
    - Two 6 mm lugholes, for #6 AWG conductors. .4
- Connections to Communications Racks and Cabinets. .12
  - General: Connectors shall be used as a connection device for TBC's to equipment racks. Paint shall be removed from the rack location where the connector is attached to ensure metal to metal contact. Star washers shall be used.
  - .2 Each rack shall have a dedicated #6AWG bonding conductor homerun to the busbar. The racks shall not be daisy-chained with a single bonding conductor back to the busbar.
- Connections to Structural Steel .13
  - Where shown on the Drawings, connect grounding conductors to structural steel using exothermic welds. Each particular type of weld shall use a kit unique to that type of weld.
- Connections to Interlocking Armoured Fiber Optic Cable .14
  - Bond the armour of the cable at both ends of the cable with armoured flex connector c/w grounding bushing sized to suit the cable.
    - Provide a #6 AWG green insulated ground cable and bond the connector to the TGB or TMGB.

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# 3.6 OUTSIDE PLANT ELECTRICAL PROTECTION CONNECTORS

- .1 All the metallic components of exposed telecommunications cables must be grounded as close as possible to the entrance of the buildings. The distance shall not exceed 3 m (10 ft). This includes:
  - .1 Bonding and grounding of cable metallic sheath components.
  - .2 Installation of protectors to metallic pairs, along with their fuse links.
- .2 Ground the metallic sheath of the bonded cables with a green jacketed #6 AWG bonding conductor to the entrance facilities ground bus bar.
- .3 Ground the cable protector using a green jacketed #6 AWG bonding conductor to the entrance facilities ground bus bar.
- .4 Ground the entrance facilities ground bus bar to the TMGB with a green jacketed #4/0 AWG bonding conductor.

**END OF SECTION 27 05 26** 

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# 27 05 28 PATHWAYS FOR COMMUNICATIONS SYSTEMS

# PART 1 GENERAL

## 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 References
- .4 System Description
- .5 Submittals

# 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 08 11.01 Fiber Optic Testing
  - .3 Section 27 08 11.02 Copper Testing
  - .4 Section 27 08 11.03 Horizontal Cat6 & Cat6ATesting
  - .5 Section 27 11 00 Communications Room Fittings
  - .6 Section 27 13 13 Copper Backbone Systems
  - .7 Section 27 13 23 Fiber Backbone Systems
  - .8 Section 27 15 00 Horizontal Cabling
  - .9 Section 27 16 00 Connecting Cords, Devices and Adaptors
  - .10 Section 27 21 33 Data Communications Wireless Access Points

# 1.3 REFERENCES

.1 Refer to section 27 01 00 for Codes and Standards

# 1.4 SYSTEM DESCRIPTION

- .1 The Communications pathway system shall be designed and installed to support, protect, organize and, where necessary, segregate IT and low voltage systems wiring. Quantity, size and bend radius requirements of the cable as well as room for growth (fill ratio) will be considered when determining the size of communications pathways. All Communications pathways installed must have adequate separation from sources of electromagnetic energy and heat as prescribed by industry standards and be easily accessible with minimal or no impact to clinical operations. It shall consist of the following subsystems:
  - .1 Cable Tray System overhead (within the ceiling space) from the building entrance rooms, equipment rooms, and TRs throughout the building space.
  - .2 Electrical metallic tubing and fittings.
  - .3 Miscellaneous conduit fittings and products.
  - .4 Conduit sleeves, Fire Stop sleeves, Conduits and Underground Ducts
  - .5 Wall outlet boxes.
  - .6 Pull and junction boxes.
  - .7 Cable Hangers overhead (within the ceiling space) from the primary pathways to the device locations.

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- .2 Pathway design and space assignment shall be coordinated with the mechanical, electrical, plumbing, and pneumatic tube systems designs.
- .3 The work under this section shall also include the planning and coordination with General Contractor (and other trades) of Communications system pathways, the furnishing of necessary materials, and the labour & associated services required to install Communications pathways.

#### 1.5 SUBMITTALS

.1 General: Conform to Submittal requirements as described in Section 27 05 00.

# PART 2 PRODUCTS

#### 2.1 CABLE TRAY

- .1 Basket
  - .1 Application: Suitable for the support & management of Communications cables, either overhead or mounted vertically on a wall.
  - .2 Description: Cable basket shall be made of steel wires and formed into a standard 50-mm by 100-mm or 50-mm by 50-mm wire mesh pattern, or in the case of Panduit Wyr-Grid, 100-mm by 125-mm. Wire intersections shall be welded. Wire ends along sides (flanges) shall be rounded during manufacturing for safety of installers and to prevent damage to cables.
  - .3 Material: Carbon steel wire, ASTM A510, Grade 1008. Wire welded, bent, and surface treated after manufacture.
  - .4 Panduit Wyr-Grid, CabloFil or Flextray.is the approved basket tray manufacturer. Panduit Wyr-Grid is approved for use inside Communications rooms only.
    - .1 If the Panduit Wyr-Grid cable tray is utilized, the Contractor must provide the following grounding components:
      - .1 Grounding Cable Hanger Brackets Part Number GACB-2
      - .2 WYR-Grid Splice Connectors
        - .1 Straight splice connector for 203mm -457mm wide WYR-Grid Part Number WGSPL1218BL
        - .2 Straight splice connector for 610mm -762mm wide WYR-Grid Part Number WGSPL2430BL
        - .3 Intersection splice connector Part Number WGINTSPLBL
    - .2 If the Panduit Wyr-Grid cable tray is needed outside the Communications room, the following requirements shall apply:
      - .1 The Contractor and or Consultant must get written approval from the PHSA compliance team.
      - .2 The Contractor must use paint-piercing split bolts with teeth to bond the cable tray to the bare copper ground cable. Refer to Section 27 05 26 Grounding and Bonding for Communications Systems.
  - .5 Fittings: Field fabricated in accordance with manufacturer's instructions from straight sections.
  - .6 Size: The minimum size tray in Acute Care sites is 100 mm x 610 mm unless specifically noted otherwise.
  - .7 Accessories
    - .3 Grounding: Terminal support and cable support for attachment on tray of continuous #6 AWG ground conductor fixing system. If the Panduit WYR-Grid cable tray is utilized, the Panduit WYR-Grid components listed above

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- must be used to ensure a constant ground connection throughout the cable tray system.
- .4 Electro-plated zinc: Support accessories and miscellaneous hardware shall be coated in accordance with ASTM B633 SC3.
- Cable Label Clips: Mark and identify specific cable runs, electro-zinc plated .5 steel
- 8. All trays in Telecommunications Rooms (TRs) shall have a six inch inside horizontal bend radius on tees and 90-degree bends. On a 90-degree fitting at the corner of a TR or corridor, the inside bend radius can be 6" inches and the outside bend radius can be 0" inches. Vertical bends shall have a minimum 12" bend radius. Ensure the design of the cable tray system will adhere to industry and Authority standards and will support manufacturers' recommendations relative to cable bend radius.

#### .2 Totally Enclosed Cable Trav

- Totally enclosed cable tray shall be used inside Parkade and other similar type locations (exposed public spaces).
- .2 Use manufactures radius bends for all directional changes to the cable tray.
- .3 Aluminium Class C1 is the minimum load class for the cable tray.
- Size: The minimum size tray in Acute Care sites is 100 mm x 610 mm unless .4 specifically noted otherwise.

#### .3 Chatsworth Runway

- For the Entrance facility room, provide 610 mm wide cable runways. Use manufacturer runway corner bracket kits for radius bends for all directional changes to the cable tray.
- .2 Chatsworth is the approved cable runway.

#### 2.2 **CABLE HANGERS**

- .1 Application: Suitable for indoor installation within ceiling space of community sites only for the support of Communications cables.
- .2 Approved Product: ERICO Caddy J-Hook. Maximum fill ratio is 28% of J-Hook capacity at substantial completion of project.

#### 2.3 **ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS**

- .1 Conduit: Shall be formed of cold rolled strip steel, electrical resistance welded continuously along the longitudinal seam and hot dip galvanized after fabrication.
- .2 Set Screw Steel type couplings: Electroplate steel or cast malleable iron: concrete tight. with insulated throat, using gland.
- .3 Compression type connectors: Electroplated steel or cast malleable iron, concrete tight, with insulated throat.
- Minimum EMT conduit size for Communications cabling shall be 27mm (1"). Conduits .4 dedicated to Voice and Data cabling shall not be shared with other technology wiring.

#### 2.4 **PULL BOXES**

Unless otherwise specified, the minimum size of a pull box shall be 310 mm x 310 mm x .1 150 mm deep. Communications Consultant and or the PHSA NE Representative shall be consulted in all cases. Refer to Section 27 05 53 for labelling requirements.

#### 2.5 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC)

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- .1 Conduit: Shall be fabricated in continuous lengths from galvanized steel strips, interlocking spirally wound, covered with extruded liquid tight jacket of polyvinyl chloride (PVC). Provide conduit with a continuous copper-bonding conductor wound spirally between the convolutions.
- .2 Fittings: Connector body and gland nut shall be of cadmium plated steel or cast malleable iron, with tapered, male, threaded; insulated throat and neoprene "O" ring gasket recessed into the face of the stop nut. The clamping gland shall be of moulded nylon with an integral brass push-in ferrule.
- .3 Application: Suitable for an indoor installation for the support of Communications cables from a feed pathway to furniture systems or similar.

# 2.6 DUCT PLUGS

- .1 Application: Suitable for installation within conduits at termination/end entering into underground maintenance holes/pull boxes and into buildings from underground/exterior, opening into a Communications space. Duct plugs shall provide a watertight (up to 20 psi) seal around inner ducts and cables.
- .2 Duct plugs shall be sized per conduit trade/actual size, per inner duct trade/actual size, and per cable outside diameter as required per instance.
- .3 Duct plugs shall be re-enterable and re-usable.
- .4 Manufacturer: CommScope TDUX Inflatable Duct Sealing System or equal approved
  - .1 Applications include ducts containing multiple copper, coax, or fiber cables, and customer premises cable entrances
  - .2 CommScope inflation tool and air compressor or air cylinder must be used to install the TDUX sealing system
  - .3 TDUX duct seals are not flame retardant and will be used with approved Hilti fire stop material
  - .4 Follow Manufacturer installation instructions

## 2.7 UNDERGROUND CABLE RACKS

- .1 Application: Suitable for support cable / splice cases in underground environment (steam tunnels, vaults).
- .2 Hot-dipped galvanized steel, manufactured from 38-mm x 14-mm x 5-mm hot-rolled steel channel, T-slots spaced at 38-mm.

# 2.8 COMMUNICATIONS SYSTEM OUTLET BOXES

- .1 A Communications outlet is the point at which the Communications equipment is connected to the Health Authority's network. The outlet consists of an outlet box and cover plate, connecting conduit, several jacks, and its connecting cables.
- .2 Outlet boxes shall be specified on drawing.
- .3 Flush-Mount Box
  - .1 Provide one-piece die formed or drawn steel, knockout type box of size and configuration as indicated on the Electrical Drawings. No sectional boxes.
  - .2 103 mm square by 54 mm deep shall be minimum box size.
  - .3 Mud ring shall be used on top of the electrical box to receive single gang outlet faceplate.
- .4 Surface-Mount Box
  - .1 Manufacturer:
    - .1 Wiremold
      - .1 V5744-2 (dual-gang for use with conduits).
      - .2 V2144-2 (dual-gang for use with V2100).

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- .3 V3044-2 (dual-gang for use with V3000).
- .2 Hubbell
  - .1 HWPFSCS/HBLFSCS series c/w cover (surface floor box).
- .3 Panduit
  - .1 JBP2D1W (132 mm x 132 mm x 70 mm dual-gang for use with Panduit).

#### 2.9 COMMUNICATIONS SYSTEM OUTLET PLATES

- .1 Unless specified to the contrary, all outlet plates shall be plastic or stainless steel with appropriate cut-outs and permanently marked designations, as specified in the outlet specifications of the related sections.
- .2 Plastic plates shall be the same colour as determined for the power outlets. The architect's decision is final.
- .3 Ensure that total depth of raceway and outlet plate is sufficient for terminating Horizontal cable and jacks.

## 2.10 SURFACE RACEWAYS PRODUCTS

- .1 Provide Wiremold or Panduit for Communications outlets.
- .2 Where metallic raceway is required it shall be as manufactured by Wiremold. The colour shall match existing Wiremold installation. Where contradiction exists between colour noted on drawing and on site, the colour on site shall take precedence.
- .3 For large number of cables and multiple outlets adjacent to each other, use Wiremold V-4000 or V-6000 as appropriate. For Wiremold V-4000, Fiber ready elbow V4011FO shall be used for flat 90° bends.
- .4 For individual outlets use Wiremold V-3000 or V-2100 raceway as indicated on drawings. For V-3000 fiber ready elbow, V3011F0 shall be used for flat 90° bends.
- Non-metallic surface raceway shall be manufactured by Panduit or approved equal. Except as noted, colour of Panduit shall be off-white on painted surfaces and grey on unfinished concrete surfaces or as otherwise architecturally specified.
- .6 Surface raceways for Communications systems shall be minimum 120 mm X45 mm deep raceways with cut-outs and hardware for mounting faceplates. When the surface raceway is used to distribute power and Communications cables, a manufactured barrier, separating Communications cables from power cables shall be installed in the centre of the raceway.
- .7 Non-metallic raceway may be used as per current building codes or as specified on drawings.

## PART 3 EXECUTION

# 3.1 GENERAL

- .1 Backbone Pathway System
  - The backbone pathway (riser) system in any Hospital construction shall provide physically route diverse connections (minimum 20-meter riser separation) between the MER and each TR in the building. The routing of the pathways should be such that a loss of single Telecommunications Room will not impact the connection between the MER and any other Telecommunications Room in the Facility.
  - .2 The TRs shall be stacked vertically to facilitate running backbone cables through them. In such cases, backbone pathways typically consist of a combination of Hilti CP-680 cast-in-place fire stop devices with CP-653-4" speed sleeves inserted into

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- them. In cases where stacking is not possible or where a riser needs to traverse through more than a floor slab to get to the next TR then 103mm EMT conduits shall be provided.
- .3 Cable tray can also form part of the backbone pathway system when TRs cannot be stacked vertically. In this instance, trays serve a dual purpose in that they support, protect and organize both backbone and horizontal cabling systems. Cable tray shall be installed in all major building corridors and inside all Communications rooms.
- .4 The most common type of cable tray installed in any building is basket tray. Totally enclosed trays shall be used in Parkades and other similar locations where the tray is exposed in areas accessible to the public. Chatsworth tray shall be installed in the EF room. All cable trays installed will typically be 610mm wide by 110mm deep. Where cable trays are required to pass through any solid walls or floors regardless of fire rating, CP-653-4 speed sleeves coupled with either gang plate assemblies or cast-in-place fire stop devices shall be employed. This applies to all types of full height walls for the purpose of either restoring the fire or acoustical rating of the wall or for infection control. The quantity of speed sleeves provided shall be equal to the capacity of the tray.
- .5 Cable tray shall not be used for the storage of horizontal or backbone cable slack.
- .6 Backbone pathway system in any Hospital construction shall also provide physically route diverse connections (minimum 20-meter riser separation) between the MER and the EF Room. Where both the MER and EF room are located on the same level, the primary and diverse pathways between these rooms will likely be comprised of cable tray.
- .7 Hospitals are post disaster sites and require separate WAN services from two different CO's (Telus Central Offices). The service entrance duct feeders (from the two CO's must also have physical route diversity. Route diversity is achieved by ensuring the two separate and diverse sets of Telus Service entrance ducts and the outside plant duct banks originating from the CO's do not run closer than 20 meters along their entire route, and the Entrance Facility rooms are at least 20 meters apart.
- .2 The Contractor shall supply and install a system of cable raceways consisting of a combination of cable tray, conduit and any other standards compliant non-contiguous support system such as saddles as required by the local facilities. The cable trays extend horizontally from the Communications Rooms, down the hallways or corridors to become the backbone or main highway to support communications cables.
- .3 Except in residential care buildings that do not have a common corridor or accessible ceiling spaces, conduits shall not be used as the main backbone communications pathway.
- .4 Each communications outlet shall be connected to the nearest cable tray with conduit. Individually connect each communications outlet in the Facility to the nearest communications cable tray within the zone as the serving TR. Conduit shall be used in new construction.
- .5 Install conduit and sleeves where required prior to pouring concrete. Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure to keep furring to a minimum.
- .6 J-hooks may be used in community sites only.
- .7 All raceway and J-hooks (when applicable) shall be installed parallel to building lines, keeping cable run length at an absolute minimum.
- .8 J-hooks shall be used for supporting horizontal cables and patchcords and not to be used for main backbone communications pathway.

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- .9 In open office environments, the preferred method of extending the conduit from the outlet to the cable tray is via perimeter walls. If this is not possible then use Pac poles or run in "pony" walls.
- .10 Where conduit size is not specified, the conduit shall be sized to not exceed a 28% fill ratio with no more than two 90° bends and after all the cables are installed at the time when a new facility becomes operational. Where there are zero bends in the conduit, the fill ratio may be increased to 40%.
- A Mule tape shall be left in all backbone raceways after installation of the cables. Mule tape shall be Greenlee 4435 or approved equal for backbone conduits.
- .12 The Contractor shall ensure adequate support for raceways and cables dropping vertically to equipment where there is no wall support. Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .13 Explosive drive pins shall not be allowed on the works without prior approval of the Communications Consultant. All fixings to be metal expansion type in pre-drilled holes. The Contractor shall not use plastic expansion inserts or fittings. The Contractor shall use coach screws, lag screws or wood screws, minimum 25 mm long, in wood construction.
- .14 The Contractor shall provide supports for equipment and materials supplied. The Contractor shall provide all anchor bolts and other fastenings, where shown on or in tile walls or wall inadequate to support the equipment, provide angle or channel iron supports to bear the equipment, independent of the wall or conduit. All hangers, supports and brackets shall be provided and installed to be consistent with the requirements of the B.C. Building Code.
- The Contractor shall provide seismic bracing of tray. Following installation of all equipment and fixings, the Contractors shall provide a seismic restraint structural review of the fixings of all devices which form part of the Communications infrastructure installation. The Contractor shall provide a structural engineer registered with the APEGBC to sign and seal the report. The Contractor shall reinstall, if necessary, supports for the equipment and fixings to the satisfaction of the structural engineer, at no additional cost to the Owner.
- .16 Cutting and Coring
  - .1 Where floor cutting is necessary for installation of conduits and cable trays, always consult a structural engineer prior to boring holes or cutting slots in floors. Obtain the services of a reputable Ground Penetration Radar" (GPR)/x-ray service company. If GPR is not suitable or approved by Facilities have the floor x-rayed and review for interference. Submit report and detail sketch on proposed infrastructure routing, signed and sealed by the structural engineer, to the Communications Consultant for review prior to cutting.
  - .2 It is expected that tradesmen skilled in their trades shall do the work of that trade. Electricians performing painting, dry-walling or carpentry work shall not be accepted.
  - .3 Ensure that all penetrations through floors or walls are patched to match adjoining finish. Penetrations through concrete are to be sealed with approved fire-stop material.
  - .4 See local Facilities Asbestos Procedures for cutting methods through asbestos areas.
  - .5 It is the contractor's responsibility to investigate existing building conditions for taking X-ray and other activities. Existing drawings and approval / scheduling are available from Facilities Maintenance and Operations (FMO). Coring of holes shall take place before new walls in close proximity are installed.
  - .6 Cutting and patching are to be done to architectural standards and shall be inspected by the architect. Refer to the architectural specifications.

.7 Refer to Fire Stop Systems Section 27 05 29.

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.8 Carpet at core locations is to be carefully cut out with a knife to the exact diameter of the pipe prior to coring if the pipe is to be exposed. Fire-stop from below at these locations

#### 3.2 ENTRANCE DUCTS

- .1 Entrance ducts are to be installed to the CEC 23rd edition C22 1-15.
- .2 Provide orange tracer warning tape above the duct bank.
- .3 Provide drainage on the duct bank prior to entering the structure. T-drains shall be provided for the duct bank, and shall be connected to the perimeter drainage system.
- .4 Provide drainage at each manhole and pull-pit.
- .5 Ducts shall have a grade drop from the building to the entrance manhole for water run-off.
- Where diverse service entrance facilities are specified, the entrance points into a building will be distant from each other and enter from two different streets or sides of the building. Minimum distance between service entrance facilities into a building will be 20m.
- .7 Provide a minimum of three (3) Type DB2 PVC orange 100mm ducts per service entrance facility. Each service entrance facility duct will:
  - .1 Not have more than two 90-degree sweeping bends.
  - .2 Be properly drained in accordance with building and electrical codes.
  - .3 Be equipped with watertight expandable duct plugs that seal the duct against water, gas, litter and vermin. Watertight expandable duct plugs shall be installed at both ends of every service entrance facility duct.
  - .4 Where applicable, terminate in pull boxes once they enter the building. Pull box shall be 1219 mm x 1219 mm x 610mm in size, accessible, lockable and equipped with hinged lids.
  - .8 The maximum pulling lengths shall not exceed 100m on any service entrance facility duct or 60m if there are 2 90 degree bends.

## 3.3 CAMPUS PERIMETER PATHWAY SYSTEM

- .1 A Campus Perimeter Pathway System (CPPS) shall be considered when designing an Outside Plant duct bank in a Hospital campus site. It provides the distribution system around the campus for all inter-building fiber and copper cabling systems. It also connects to TELUS and the City's underground structures to enable cabling infrastructure and telecommunications services from third parties to be brought into and distributed throughout the campus. It includes diverse Service Entrance Facilities to EF rooms and MERs.
- .2 Manhole ducts shall be stubbed out for diverse Service Entrance Facilities.
- .3 A concrete encased Service Entrance Facility shall be extended into either the EF room or MER.
- .4 All Service Entrance Facilities installed shall consist of a minimum of three PVC DB2 103mm ducts. If the ducts have to transition to EMT before entering either the EF room or MER, then four 103mm conduits are to be provided back to the point where PVC ducts enter the building.

# 3.4 DUCT PLUGS

- .1 Provide duct plugs at all underground conduit ends. Install plugs per manufacturer's instructions or guidelines.
- .2 Provide bushings and gaskets in each used duct port.

# 3.5 UNDERGROUND CABLE RACKS/ SUPPORTS

.1 Preparation

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- .1 Locate cable racks/supports in existing steam tunnel as required to support new/relocated cable installation requirements.
- .2 Installation
  - .1 Install in accordance with Manufacturer's written instruction.

#### 3.6 BACKBONE CONDUITS AND SLEEVES

- .1 Backbone conduits and sleeves in Communications rooms shall be positioned against the wall to the left of the connector blocks (CSTD-06). The exact location shall be verified with Communications Consultant. The use of a pull pit in the Communications rooms shall not be acceptable. (Refer to Section 27 11 00).
- .2 Provide a minimum of 4 x 103mm Riser sleeves or ducts. Add one additional 103mm riser sleeve or duct for every additional Communications room serviced from a riser stack. For example: Where there are six Communications rooms in a riser stack, (one on each level where level 1 (MER is the beginning of the riser and level 6 is the end; provide the following communications riser:
  - .1 Level 1 provide 9 x 103 mm riser sleeves or ducts
  - .2 Level 2 provide 8 x 103 mm riser sleeves or ducts
  - .3 Level 3 provide 7 x 103 mm riser sleeves or ducts
  - .4 Level 4 provide 6 x 103 mm riser sleeves or ducts
  - .5 Level 5 provide 5 x 103 mm riser sleeves or ducts
  - .6 Level 6 provide 4 x 103 mm riser sleeves or ducts
- .3 Ducts shall protrude 100 mm above finished floor level and shall be encased in concrete.
- .4 Riser ducts connecting vertically stacked Communications rooms may consist of sleeves that protrude 50 mm through the ceiling and or 100 mm through the floor.
- .5 After installation of the inter-building cables, the ducts shall be closed with an approved re-enterable sealing material.
  - Refer to Section 3.6 for further details concerning backbone sleeve requirements.

## 3.7 PATHWAYS THROUGH FIRE-RATED BARRIERS

- .1 All communications cable trays that need penetrate through fire rated walls and where there is an accessible ceiling on both sides of the wall; shall terminate on both sides of the rated wall and the following rated assembly shall be installed:
  - .1 Provide a rated assembly through a gypsum wall penetration based on a HILTI Speed Sleeve Gang Plate assembly using 103 mm HILTI Speed sleeves.
    - .1 Provide four (4) speed sleeves for a 305 mm x 100 mm cable tray.
    - .2 Provide six (6) speed sleeves for a 450 mm x 100 mm cable tray.
    - .3 Provide eight (8) speed sleeves for a 610 mm x 100 mm cable tray.
  - .2 Provide a rated assembly through a concrete wall penetration based on a HILTI Speed Sleeve Gang Plate assembly using 103mm HILTI Speed sleeves.
    - .1 Provide four (4) speed sleeves through concrete (cored holes) for a 305 mm x 100 mm cable tray.
    - .2 Provide six (6) speed sleeves through concrete (cored holes) for a 610 mm x 100 mm cable tray.
    - .3 The installation of HILTI Speed sleeves in combination with HILTI Cast-inplace sleeves are acceptable provided a HILTI system drawing is provided during the shop drawing submittal phase.
  - .3 Hilti Speed sleeves are to be provided where cable trays are required to pass through "any solid walls" regardless of whether they are fire rated or not.
- .2 For communications riser sleeves penetrating a concrete floor inside communication rooms.

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- Provide a rated assembly through a concrete floor penetration based on using 103 .1 mm HILTI Speed sleeves through HILTI Cast-in-Place sleeves.
- .3 For the installation of all other communication conduit pathways through fire rated barriers, refer to fire stop section 27 05 29.

#### 3.8 **CABLE TRAY SYSTEM**

- .1 Division 27 Contractor shall install all travs within Communications rooms. This work relating to Communications room fittings shall not be sub contracted to Division 26 Contractor.
- .2 Within the Communications rooms, install cable tray Unistrut support on the underside of the tray and locate directly above each vertical cable manager for mounting the power receptacles.
  - .1 The appropriate power extension cords shall be ordered as per the parts list in Appendix C.
  - .2 All power cord ends must be molded.
- Provide cable tray in approximate location and general routing as shown on drawings. .3
- Cable trays are usually installed in the false ceiling space of hallways and located to keep .4 conduit lengths to a minimum. When raceway is not installed in a readily accessible false ceiling space, access hatches shall be installed at a nominal spacing of 9m.
- .5 Do not route cable tray through Electrical room and Mechanical room spaces.
- Locate new cable tray away from existing maintenance openings in the ceiling. .6
- .7 Cable tray may require installation of risers, bends, etc. to adjust tray up or down as well as sideways for the tray routing to fit within limits of space available, and to clear other services, ducts, pipes etc. along the route. Routing may be adjusted somewhat as necessary to enable installation of services under other trades. These field adjustments are to be done at no extra cost to the Owner.
- Provide communication cable trays with depth and width as specified. Install 300 mm .8 radius minimum bend kits and all manufacturer fittings required for a complete cable tray system. Provide an allowance for all changes in direction or elevation of the cable tray.
- .9 Do not cut the basket tray for cable exit, instead use manufacturer dropout that is designed to be attached to the tray side with the dropout hanging over the tray. Adjust the tray layout such that the dropout enables the cables to be routed directly and fully into entire cross sectional area of the the rear half of the vertical cable managers, GigaBIX cable management modules or false wall. Perimeter basket tray inside the Communications room shall be offset at about 250 mm from the wall to the near side of the tray for attachment of tray dropouts to deliver cables into GigaBIX cable management modules and any low voltage wall-mount panels.
  - Provide a cable tray dropout for all wall mounted equipment in the Communications room and at a minimum every 1200 mm along the perimeter cable tray of the Communications room.
- .10 Sharp metal edges in cable travs which could cut the cable shall be smoothed and the cable dressed away from these edges. Manufacturer surface imperfections shall be touched up with a cold galvanizing coating before installing cable.
- Connect the new cable tray system to the existing cable tray (if exists). Re-work existing .11 tray ends to suit tie-in.
- .12 Cable Tray Installation
  - Cable tray shall have a maximum fill of 50 percent, but the day one planned fill when a new facility becomes operational shall be 25 percent to allow for later additions. A calculated fill of 50% for four-pair and similar diameter cables will physically fill the entire tray due to spaces between cables, and random placement. The maximum fill depth of any cable tray shall be 150 mm.

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- Install cable system in accordance with manufacturer's instructions and recognized .2 industry practices, and ensure that the installed system complies with requirements of the "Manufacturer's Cable Tray Installation Guidelines" pertaining to general electrical installation practices. Install cable system using splice connectors, support components, and other accessories by the same manufacturer.
- Provide supports for cable tray system at a maximum 1220 mm on centre and at .3 both sides of each tray transition per a given route. A support should be placed within 600 mm on each side of any connection to a bend, tee, or cross. Supports shall be dual support hangers, trapeze hangers or wall brackets. Trapeze hangers shall be supported by structurally approved anchoring system, and shall consist of 9.5 mm (maximum size) threaded rod with appropriate hardware (nuts. washers.
- .4 Provide materials necessary to properly support system from existing building constructions per manufacturer's instructions and meeting or exceeding recognized industry practices, and as appropriate for this project. Provide special accessories as required to protect, support and install a cable tray system.
- .5 Interface With Other Work:
  - Field verify route prior to installation. .1
  - .2 Coordinate the installation of the cable trav system with other trades.
  - .3 Do not support from ductwork, piping, or other equipment hangers.
- .6 Installation clearances:
  - Install system a minimum of 1220 mm from any motor. .1
  - .2 Install system a minimum of 50 mm from fluorescent light fixtures, or other EMI sources.
  - .3 Install system a minimum of 250 mm from the adjacent wall, unless otherwise instructed by the Communications Consultant and or the PHSA NE Representative.
  - Install system to allow a minimum of 300 mm vertical clearance from the top .4 of the cable tray to all ceilings, heating ducts, and heating equipment and 150 mm for short length obstructions; 600 mm horizontal clearance on one side of cable trays; and 75mm below bottom of the cable tray of clearance from piping, conduits, ductwork, etc.
- Install cable tray support hangers between 150 mm and 305 mm above ceiling grid. Vertical Cable Trav
  - For a riser sleeve configuration consisting of 5 x 100mm (4") sleeves per row .1 with each sleeve consisting of a combination of Hilti speed sleeve inside a cast-in-place sleeve, a minimum tray width of 914mm (36") shall be required.
  - .2 For a riser sleeve configuration consisting of 4 x 100mm (4") sleeves per row with each sleeve consisting of a combination of Hilti speed sleeve inside a cast-in-place sleeve, a minimum tray width of 762mm (30") shall be required.

#### 3.9 **CABLE HANGERS**

- .1 Install J-Hooks a maximum spacing interval of 1200 mm.
- .2 Do not attach the J-Hook to the T-Bar wire support.

#### 3.10 **CONDUIT**

.13

- .1 Zone Conduit System
  - It is acceptable to install a zoned conduit and pull-box system instead of cable tray in existing and new residential care buildings that do not have a common corridor or accessible ceiling spaces. Consult with the Communications Consultant and or

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- the PHSA NE Representative to confirm the suitability of a zone conduit system prior to designing and specifying this solution.
- .2 When zone conduit is used, install in a minimum 310 mm X 310 mm X 150 mm deep pull-box in each room's ceiling space. Conduit to Communications outlet shall be from this pull-box.
- .3 A maximum of two (2) outlets may share the same 30 mm conduit of short distribution distance.
- .4 Provide pull boxes such that conduit length shall not exceed 9m and the number of 90° bends shall not exceed two (2).
- .2 Unless specified to the contrary in the outlet specification or drawings, each drop conduit or Communications outlet shall be connected to the nearest cable tray.
- .3 Unless specified to the contrary by the Communications Consultant and or the PHSA NE Representative, flexible metal and PVC jacketed conduit shall can only be used to connect to modular furniture or custom millwork.
- .4 All conduits shall have sweeping bends with inside radius being no less than six (6) times the internal diameter of the conduit. For conduit 50mm or larger, the bend radius shall be no less than ten (10) times the internal conduit diameter. Fittings such as LB type joints are not acceptable.
- .5 Provide sweeping 90° bends for conduits where conduits are above cable trays and cables are running from the conduits to cable trays to create a water fall effect to reduce the strain on cables.
- .6 When cable trays are used, conduit shall be attached to the edge of the tray with a conduit bracket designed for this purpose. If this is not possible, conduit shall be stubbed within 150 mm above the tray and terminate in a bonding type bushing.
- .7 The colour scheme for painted bands used to identify conduits, pull boxes, junction boxes, etc. that are used for communications cabling shall be green. The low voltage systems covered under this colour scheme include Voice and Data, Security, Door Intercom, CATV/CCTV and Building Automation.
- .8 Install surface conduits on exposed walls where additional outlets are to be installed on existing walls. Install conduits and cables within new walls. In rooms where conduits are exposed, locate them so as not to interfere with the installation of white boards or other obstructions.
- All conduit shall be fixed to or hung from building structure and shall not be fixed to or hung from building services, i.e. ducts, pipes, electrical conduits, sprinkler pipes, etc. Install fastenings and supports at regular intervals as required for each type of equipment, cables and conduits, and in accordance with manufacturer's installation recommendations. Provide and correctly locate all hangers and clips for the installation of all work under this Division. They shall be firmly secured to the structure.
- .10 The Contractor shall use rigid conduit for penetrations through exterior masonry/concrete walls and foundations, concrete floor slabs on grade
- .11 Electrical Metallic Tubing (EMT) and Fittings
  - .1 Electrical metallic tubing (EMT): Shall be used to conceal interior low voltage cables where runs are concealed above suspended ceilings, in walls, furred spaces and crawl spaces.
  - .2 Preparation:
    - .1 Locations of conduit runs shall be planned in advance of the installation and coordinated with ductwork, plumbing, ceiling and wall construction in the same areas and shall not unnecessarily cross other conduits or pipe, nor block access to mechanical or electrical equipment.
    - .2 Where practical, install conduits in groups in parallel vertical or horizontal runs and at elevations that avoid unnecessary offsets.
    - .3 All conduits shall be run parallel or at right angles to the centrelines of columns and beams.

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- .4 Conduits shall not be placed closer than 305 mm to a flue, parallel hot water, steam line or other heat producing source or 75 mm from such lines when crossing perpendicular to the runs.
- .5 Exposed conduit installation shall not encroach into the ceiling height headroom of walkways or doorways. Where possible, install horizontal raceway runs above water and below steam piping.
- .6 In long runs of conduit provide sufficient pull boxes inside buildings to facilitate pulling wires and cables, with spacing not to exceed 45 m. Support pull boxes from structure independent of conduit supports. These pull boxes are not indicated on the Drawings.
- .7 Provide all reasonably inferred standard conduit fittings and products required to complete conduit installation to meet the intended application whether noted, indicated or specified in the Contract Documents or not.

## .3 Installation

- .1 Install conduit as indicated on Drawings and as specified herein.
- .2 Install conduits in complete runs before pulling in cables or wires.
- .3 Install conduit free from dents, bruises or deformations. Remove and replace any damaged conduits with new undamaged material.
- .4 Conduits shall be well protected and tightly covered during construction using metallic bushings and bushing "pennies" to seal open ends.
- .5 Clean any conduit in which moisture or any foreign matter has collected before pulling in conductors. Paint all field-threaded joints to prevent corrosion.
- .6 Conduit systems shall be mechanically and electrically continuous throughout.
- .7 Metallic conduit shall not be in contact with other dissimilar metal pipes (i.e. plumbing).
- .8 Make bends with standard conduit bending hand tool or machines. The use of any item not specifically designed for the bending of electrical conduit is strictly prohibited.
- .9 A run of conduit between terminations at wire pulling points shall not contain more than the equivalent of two quarter bends (180 deg. total).

# .4 Penetrations

- .1 Cutting of holes:
  - Cut holes through concrete, masonry block or brick floors and floors of structure with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Structural Engineer as required by limited working space. Obtain the approval of the Structural Engineer prior to drilling through structural sections.
  - .2 Fire stop: Where conduits pass through fire rated partitions, walls, smoke partitions or floor; install a UL classified fire stop material to provide an effective barrier against the spread of fire, smoke and gases. Completely fill and seal clearances between raceways and openings with the fire stop material. Refer to Fire Stop Systems 27 05 29.
  - .3 Waterproofing: At floor, exterior wall and roof conduit penetrations, completely seal clearances around the conduit and make watertight.
  - .4 For roof penetrations furnish and install roof flashing, counter flashing and pitch-pockets.
  - .5 Provide membrane clamps and cable sealing fittings for any conduit that horizontally penetrates the waterproof membrane. Conduits that horizontally penetrate a waterproof membrane shall fall away from and

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below the penetration on the exterior side a minimum of two times the conduit diameter.

## .5 Terminations and Joints

- .1 Use raceway fittings that are of types compatible with the associated raceway and suitable for use at the location.
- .2 Raceways shall be joined using specified couplings or transition couplings where dissimilar raceway systems are joined.
- .3 Conduits shall be securely fastened to cabinets, boxes and gutters using two locknuts and an insulating bushing or specified insulated connectors. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.
- .4 Conduit terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.

# .6 Supports

- .1 All raceways systems shall be secured to building structures using specified fasteners, clamps and hangers spaced according to the CEC.
- .2 Support single runs of conduit using one-hole pipe straps. Where run horizontally on walls in damp or wet locations, install "clamp backs" to space conduit off the surface.
- .3 Multiple conduit runs shall be supported using "trapeze" hangers fabricated from specified construction channel, mounted to 9.5 mm diameter and threaded steel rods secured to building structures. Fasten conduit to construction channel with standard one-hole pipe clamps or the equivalent. Provide lateral seismic bracing for hangers.
- .4 Fasteners and supports in solid masonry and concrete:
  - .1 Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
- .5 After concrete installation:
  - .1 Steel expansion anchors not less than 6 mm bolt size and not less than 28 mm embedment.
  - .2 Power set fasteners not less than 6 mm diameter with depth of penetration not less than 75 mm.
  - .3 Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
- .6 Hollow masonry: Toggle bolts are permitted. Bolts supported only by masonry block are not acceptable.
- .7 Metal structures: Use stainless steel machine screw fasteners or other devices specifically designed and approved for the application.

#### 3.11 OUTLET BOXES

## .1 Preparation

- .1 Locate pull boxes and junction boxes in accessible locations.
- .2 Install outlet boxes at the locations and elevations indicated on the Drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of construction conditions.

#### .2 Installation

- .1 Install boxes as indicated on Drawings and as specified herein.
- .2 Do not install outlets back-to-back in wall; and allow a minimum of 150 mm horizontal clearance between boxes.

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- .3 Change location of outlets at no extra cost or credit, provided distance does not exceed 3 m, and information is given before installation.
- .4 Locate electrical boxes as indicated on Drawings and as required for splices, taps, wire pulling, equipment connections and Code compliance.
- .5 Install junction or pull boxes where required to limit bends in conduit runs to not more than 180 degrees or where pulling tension achieved shall exceed the maximum allowable for the cable to be installed. Note that these boxes are not indicated on the Drawings.
- .6 Leave no unused openings in any box. Install close-up plugs as required to seal openings.
- .7 Provide cast metal boxes with gasketed cast metal cover plates where boxes are exposed in damp or wet locations or located in hazardous areas.
- .8 Use conduit outlet bodies to facilitate pulling of conductors or to make changes in conduit directions only. Do not make splices in conduit outlet bodies.
- .9 Mounting height of equipment is from finished floor to centre line of equipment unless specified or indicated otherwise.
- .10 If mounting height of equipment is not specified or indicated, verify with Communications Consultant and or the PHSA NE Representative before proceeding with the installation.
- .11 Communications outlets:
  - .4 Above finished floors generally 300 mm, or match mounting height of existing voice/data outlets.
  - .5 Above counters splash backs 150 mm.
- .3 Supports
  - .1 Support boxes independently of conduit system.
  - .2 Support boxes, mounted above suspended acoustical tile ceilings, directly from the structure above.

## 3.12 PULL BOXES

.1 Pull boxes installed inside accessible ceilings shall be within 600 mm of T-bar ceiling grid for ease of access in future.

# 3.13 SURFACE RACEWAYS INSTALLATION

- .1 Install Wiremold raceway where indicated on the drawings for power and Communications outlets.
- .2 The surface raceway shall parallel building lines and hug ceilings, baseboards, and corners. Raceway length shall be kept to a minimum.
- .3 The surface raceway base shall be mechanically fastened to walls and supporting structures. Use of double-sided tape alone is not acceptable. For non-metallic surface raceway the maximum spacing of fastener is 400 mm. The recommended fasteners are as follow:
  - .1 Masonry surface Tapcon masonry type fastener, 6 mm dia.
  - .2 Dry wall with no stud Toggler AF "Alligator type" anchor. AF8 or AFG6.
  - .3 Dry wall with stud Dry wall screw.
- .4 The surface raceway shall maintain its integrity when passing through a wall or supporting structure. The raceway cover shall be cut 100 mm from either side of the penetration.
- .5 Surface raceway extending into the ceiling shall connect to the conduit extending from the cable tray with the appropriate fitting or pull box.

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- .6 When installing surface raceway, manufactured bends and fittings must be used. Installation shall be in accordance with the manufacturer's instructions.
- .7 Wire clips shall be installed in two-piece surface raceway installations at 450 mm centres. Additional wire clips shall be used when the raceway is secured to a ceiling or large amounts of cables are installed.

When installing cable in surface raceway, cable fill shall not exceed 28% with no more than two 90° bends after all the cables are installed at the time when a new facility becomes operational. Where there are zero bends in the surface raceway, the fill ratio can be increased to 40%.

**END OF SECTION 27 05 28** 

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## 27 05 29 FIRE STOP SYSTEMS

# PART 1 GENERAL

## 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 Requirements
- .4 References
- .5 Quality assurance
- .6 Training

#### 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 05 29 Pathways for Communications
  - .3 Section 27 21 33 Data Communications Wireless Access Points

#### 1.3 REQUIREMENTS

- .1 The Contractor shall submit to the Communications Consultant and or the PHSA NE Representative for approval, the following items relating to the fire-stop system:
  - .1 HILTI Speed Sleeve manufacturer, or approved alternative, technical data for each product intended to be used on site including product description, specifications and storage requirements.
- .2 Firestop design documentation shall include a schedule indicating:
  - .1 Listed firestop system tested to CAN/ULC-S115-11.
  - .2 Number of firestop locations.
  - .3 Type of penetration.
  - .4 Type of building construction at point of penetration.
  - .5 Hourly fire-rating of floors and walls.
  - .6 Firestop device or system proposed.
  - .7 Installation Procedures and Material Safety Data Sheets shall be included with products delivered to the job site.
  - .8 Maintenance manuals and maintenance data that may be published by Manufacturer.

## 1.4 DOCUMENTS

.1 This section of the Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

# 1.5 REFERENCES

- .1 CAN/ULC-S115-11, Standard Method of Fire Tests of Through Penetration Fire Stops.
- .2 CAN/ULC-S102-M, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .3 ASTM E814, Standard Method of Fire Tests of Through-Penetration Fire Stops.

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- .4 UL 1479, Fire Tests of Through-Penetration Firestops.
- .5 UL Fire Resistance Directory: Through Penetration Firestop Devices (XHCR) and Through Penetration Firestop Systems (XNEZ).
- .6 ASTM E119, Fire Tests of Building Construction and Materials (for fire-rated architectural barriers).
- .7 ASTM G-21, Standard Test for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- .8 BICSI Current Edition, Telecommunications Distribution Methods Manual (TDMM), Chapter 11, Firestopping
- .9 Factory Mutual Approval Guide.
- .10 ULC List of Equipment and Materials, VOL. II.
- .11 Current Canadian Electrical Code
- .12 Current BC Building Code
- .13 Installed fire stopping systems shall meet approval of Local Authorities having jurisdiction.

## 1.6 QUALITY ASSURANCE

- .1 A manufacturer's direct representative (account manager, fire protection specialist, not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This shall be done per manufacturer's written recommendations published in their literature and drawing details.
- .2 For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's firestop custom detail derived from similar UL system designs or other tests shall be submitted to the AHJ for their review and approval prior to installation. Firestop custom detail drawings must follow requirements set forth by the International Firestop Council.
- .3 Manufacturer's fire protection specialist to provide site walk-through report detailing visual review of a random sampling of applications.

# 1.7 TRAINING

.1 The Contractor must receive training through the Firestop University program offered from HILTI, or approved alternative, and possess current certification prior to installing firestop products.

## PART 2 PRODUCTS

# 2.1 GENERAL

- .1 Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with CAN/ULC-S115-11.
  - .1 F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.
  - FT-Ratings: For penetrations of a firewall that is required to have a fire resistance rating in conformance with BCBC Article 3.2.1.2, not less than the fire-resistance rating of the fire separation being penetrated.
- .2 Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with CAN/ULC-S115-11.
  - .1 F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.

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- .2 FT-Rating: For penetrations of a fire separation required to have a fire-resistance rating in conformance with BCBC Article 3.2.1.2, not less than the fire-resistance rating of the floor construction being penetrated.
- T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
- .4 W-Rating: Class 1 rating in accordance with water leakage test per UL 1479.
   .3 Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with CAN/ULC-S115-11.
  - .1 L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.
- .4 Mould Resistance: Provide penetration firestopping with mould and mildew resistance rating of 0 as determined by ASTM G21.

	Hilti Canada
Sealants Firestop products such as FS- One MAX, CP606. CFS-S SIL GG, and CFS-S SIL SL used to seal openings	
Cast in Place CP 680 M (metal) & P/PX (plastic) Simple cast-in place device and adaptor for firestopping pipes	
Mortar CP 637 Item No.: 340645 Quick-setting compound for firestopping a wide variety of applications including large penetration openings in floors or walls. "This is a pproved for Conduit Penetrations Only"	
Putty Pads, Sticks & Wraps Firestop sticks (CP 618), pads (CFS-P PA, CP 617) and wrap strips (CP 648E/648S) used in cable and pipe applications	Harry and 11
Cable Collar CFS-CC 4" Item No.: 2065421 Surface mounted repenetrable solution for cables through walls and floors	

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Collars Collars (CP 643N, CP 644) used for firestopping combustible pipes	
Speed Sleeve CP 653-4" Firestop sleeve: Item No.: 00236324 Ready-to-use, one-step cable management firestop device.	
CFS-BL Fire Blocks Item No: 2030020 Ready-to-use, Intumescent Flexible Block Based on a Two- Component Polyurethane Foam	
Fire stop Plugs CFS-PL Reusable intumescent firestop plug used for small round openings	Freston Pag GFS-FPL

## 2.2 SPECIFIC REQUIREMENT

- .1 For communications rooms, provide the Hilti CP-653-4" speed sleeves in the walls. For riser sleeves, use a combination of Hilti CP 680 cast-in-place firestop devices c/w CP-653-4" speed sleeves inserted into them. Refer to the Hilti Systems drawing.
- .2 Refer to Hilti F-A-3060 system drawing and C-STD-033.3 Cast-in place/Speed sleeve fire stop drawing.
- .3 Use the Hilti CFS-SL GP ganging wall plate when installing 2 or more Hilti Speed sleeves.

# 2.3 ACCEPTABLE MANUFACTURERS

.1 Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

Hilti (Canada) Corporation, Mississauga, Ontario 1-800-363-4458

1-000-303-4430

www.,hilti.ca.

.1 Provide products from the above acceptable manufacturer; only reviewed and approved alternates can be used as substitutions.

# 2.4 MATERIALS

.1 Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

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- .2 Use only firestop products that have been ULC or cUL tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- .3 Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating gypsum or masonry walls, the following products are acceptable:
  - .1 Hilti Speed Sleeve (CP 653) with integrated smoke seal fabric membrane.
  - .2 Hilti Firestop Sleeve (CFS-SL SK)
  - .3 Hilti Retrofit Sleeve (CFS-SL RK) for use with existing cable bundles.
  - .4 Hilti Cable Collar (CFS-CC)
  - .5 Hilti Gang plate (CFS-SL GP) for use with multiple cable management devices.
  - .6 Hilti Gang plate Cap (CFS-SL GP CAP) for use at blank openings in gang plate for future penetrations.
- .4 Pre-formed, round firestop devices with integrated intumescent strips for use with non-combustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors and/or gypsum walls, the following products are acceptable:
  - .1 Hilti Cast-In Place Firestop Device (CP 680-P/PX) for use with combustible penetrants.
  - .2 Hilti Cast-In Place Firestop Device (CP 680-M) for use with non-combustible penetrants.
  - .3 Hilti Speed Sleeve (CP 653) for use with cable penetrations.
  - .4 Hilti Firestop Drop-In Device (CFS-DID) for use with non-combustible and combustible penetrants.
- .5 Sealants, foams or caulking materials for use with non-combustible items including rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
  - .1 Hilti Intumescent Firestop Sealant (FS-ONE MAX)
  - .2 Hilti Fire Foam (CP 620/CP 660)
  - .3 Hilti Flexible Firestop Sealant (CP 606)
  - .4 Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
  - .5 Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
- .6 Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including PVC jacketed, flexible cable or cable bundles, and plastic pipe, the following products are acceptable:
  - .1 Hilti Intumescent Firestop Sealant (FS-ONE MAX)
- .7 Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
  - .1 Hilti Intumescent Firestop Sealant (FS-ONE MAX)
  - .2 Hilti Fire Foam (CP 620/CP 660)
  - .3 Hilti Flexible Firestop Sealant (CP 606)
  - 4 Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
- Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
  - .1 Hilti Firestop Putty Stick (CP 618)
  - .2 Hilti Firestop Plug (CFS-PL)
- .9 Wall opening protective materials for use with cUL / ULC listed metallic and specified non-metallic outlet boxes, the following products are acceptable:
  - .1 Hilti Firestop Putty Pad (CFS-P PA/CP 617)
  - .2 Hilti Firestop Box Insert
- .10 Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
  - .1 Hilti Firestop Mortar (CP 637)
  - .2 Hilti Firestop Block (CFS-BL)

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- .3 Hilti Fire Foam (CP 620/CP 660)
- .4 Hilti Firestop Board (CP 675T)
- .5 Hilti Composite Sheet (CFS-COS)
- Non curing, re-penetrable materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
  - .1 Hilti Firestop Block (CFS-BL)
  - .2 Hilti Firestop Board (CP 675T)
- .12 For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
  - .1 Hilti Firestop Block (CFS-BL)
  - .2 Hilti Firestop Plug (CFS-PL)
  - .3 Hilti CP 680 Cast-In Place Firestop Device (for floors only)
- .13 The Contractor shall use firestop materials that have no irritating or objectionable odours, when firestopping occupied areas of existing buildings.
- .14 Firestop products used in cross-sectional areas of pathway such as inside sleeves, or cable tray penetrations of fire barriers shall be of re-enterable and reusable type to enable future Moves, Additions, or Changes.

# PART 3 EXECUTION

# 3.1 COORDINATION

- .1 Firestop systems installed by the Contractor shall meet the requirements of all applicable codes and ULC standards.
- .2 The Contractor shall firestop new Communication pathway and/or cable penetrations of building fire barriers with an approved firestop system, following cable installation.
- .3 The Contractor shall firestop with an approved firestop system, any holes created by the Work of this Contract.
- .4 The Contractor shall coordinate all Work with Division 26 and the site's Facilities Maintenance and Operations department.
- .5 The Contractor shall obtain inspection approval from local Authority Having Jurisdiction (AHJ) and the site's Facilities Maintenance and Operations department and shall be responsible for all associated costs.
- .6 The Contractor shall provide equipment, materials, labour, and services not specifically mentioned or shown which may be necessary to complete or perfect all parts of this installation and in compliance with requirements stated or reasonably inferred by the Contract Documents

## 3.2 INSTALLATION

- .1 The Contractor shall select appropriate firestop assembly to suit the type of penetration, and base the selection on criteria specified herein.
- .2 Refer to Appendix F for other firestop systems that align with the applications that are described in this Section.
- .3 Selected firestop systems shall not be less than the hourly fire-ratings indicated in the Contract Documents for each respective penetration through fire-rated floor, wall, or other partition of building construction.
- .4 Firestop for each type of penetration shall conform to manufacturer's firestop design drawings or approved modifications, and meet requirements of an independent testing laboratory.

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- .5 The Contractor shall perform all necessary coordination with trades constructing floors, walls, or other partitions with respect to size and shape of each opening, device, or firestop system approved for use in each instance. Also, the Contractor shall resolve any feasibility or obstruction issues.
- .6 In areas accessible to public and other "finished" areas, the Contractor shall prepare the surface area surrounding firestop penetrations to match finished quality of adjoining surfaces.
- .7 The Contractor shall provide damming materials, plates, wires, restricting collars, and devices necessary for proper installation of a firestop system.
- .8 The Contractor shall remove combustible installation aids after firestopping material has
- .9 All Firestop assemblies shall be installed in accordance with the manufacturer instructions in order to maintain the specific rating assigned by the independent testing laboratory.
- .10 The Contractor shall remove excess materials and debris and clean adjacent surfaces immediately after application.

#### 3.3 EXISTING PENETRATIONS

- .1 In existing buildings, the Contractor shall firestop any gaps or cavities between penetrating cable tray, ducts, or sleeves and surrounding surface area.
- .2 In existing buildings, even if there are existing cables running in the riser and the holes and slots are not filled with firestop products, if the Contractor is running any new cabling in, then that is their responsibility to ensure it is firestopped correctly.
- .3 The Contractor shall firestop with an approved firestop system, the following existing penetrations of building fire barriers:
  - Existing Communication pathway, cables, or holes that are not firestopped and are within 1 m (3') of new Communication pathway, or cable penetrations of fire barriers.
  - .2 Existing Communication cables abandoned by the Work of this Contract.
- .4 Firestop assemblies consisting of wrap around individual steel collar sections complete with intumescent putty material that completely surround penetrations, shall be used for non-metallic pipes.

#### 3.4 MASONRY POINTING PATTERN

.1 Where firestop systems penetrate masonry barriers, the Contractor shall make good surrounding area by replicating original pointing pattern and matching in quality of workmanship.

## 3.5 INSPECTING AUTHORITIES

- .1 The Contractor shall remove and expose firestop systems to the extent directed by Inspecting Authority for the purpose of carrying out the inspection.
- .2 The Contractor shall re-install firestop system and restore any affected building components removed for inspection, at no cost to the Owner.

#### **END OF SECTION 27 05 29**

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### 27 05 53 IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

### PART 1 GENERAL

#### 1.1 SUMMARY

- .1 Summary
- .2 General

### 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 11 00 Communication Room Fittings
  - .3 Section 27 13 13 Copper Backbone Systems
  - .4 Section 27 13 23 Fiber Backbone Systems
  - .5 Section 27 15 00 Horizontal Cabling
  - .6 Section 27 21 33 Data Communications Wireless Access Points

#### 1.3 GENERAL

- .1 Overview
  - .1 Before commencing the labelling, the Contractor shall supply samples of methods of labelling and materials used for approval by Communications Consultant and or the PHSA NE Representative.

#### PART 2 PRODUCTS

#### 2.1 LABELS

- .1 Labels for GigaBIX termination hardware.
  - .1 Labels are supplied in sheets:

White LAN, PBX, Multiplexer, Category 3 tie cable between VP1 patch

panel and the GigaBIX

Green label Entry connect (ISP Interface), Category 3 cable from the EF to

MER

Blue label Horizontal

Purple label 1<sup>st</sup> level Backbone Riser (MER to TR)

Grey label 2<sup>nd</sup> level Backbone Riser Tie (TR to TR or MER to 2<sup>nd</sup> MER)

Brown label Inter-building Backbone Campus

## SUBSTITUTES ARE NOT ACCEPTED

- .2 Colour scheme for jacks: Black.
- .3 Colour scheme for faceplates: match colour of electrical faceplate.

.2 Cable label for indoor cable and indoor/outdoor Interlocking armoured type fiber optic cables,

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- Label type for cable labels: Labels shall be pre-cut for quick and easy application. .1
- .2 Labels shall be in self-adhesive polyester or non-adhesive polyester (depending on
- .3 Fiber Optic Cable label for marking cables inside outdoor pull-boxes and manholes.
  - Self-Laminating Rigid Vinyl equal to: Panduit Part # PST-FO.
- Labels used for patch panels, jack outlets and ceiling T-bar, junction box covers, access .4 panels and any other similar infrastructure used for Communications systems:
  - Equal or better than Brothers P-Touch labels with extra strength adhesive.
  - .2 Depending on the finish of the surface, the contractor may need to provide an alternate solution to ensure the label sticks correctly and doesn't fall off over time.

#### PART 3 **EXECUTION**

#### 3.1 INSTALLATION

- .1 All Communications rooms shall be assigned a unique alpha-numeric ID number. The number shall be displayed in the form of a lamacoid label supplied by the Contractor. Each character shall be 50 mm high x 40 mm wide permanent Blue digits on a Yellow background. The Contractor shall install the lamacoid. The exact placement shall be highly visible on top of cable termination wall in the Communications rooms.
  - Labelling of Communications room exterior door frames requires that a plaque or lamacoid identifying the Communications room ID number be added to the door frame in the opposite corner from the plague or lamacoid identifying the architectural room number. Background colour and lettering colour and size of Communications room ID plaque or lamacoid to equal what is provided for the architectural room number plague or lamacoid. The numbers and not the background shall be 25 mm high x 20 mm wide engraved on lamacoid in permanent Blue on Yellow background.
  - In existing facilities, labelling of Communications room exterior door frames requires .2 that in the absence of the architectural room ID number, a plaque or lamacoid identifying the architectural room ID number be added to the door frame in the opposite corner from the plaque or lamacoid identifying the Communications room number. Background colour and lettering colour and size of architectural room ID plague or lamacoid to equal what is provided for the Communications room number plague or lamacoid. The numbers and not the background shall be 25 mm high x 20 mm wide engraved on lamacoid in permanent Blue on Yellow background unless otherwise prescribed by onsite Facilities Maintenance and Operations.
- .2 All racks and cabinets shall be assigned an alpha-numeric ID number e.g. C1, C2, R1, R2, etc. The number shall be displayed in the form of a lamacoid label supplied by the Contractor. Each character shall be 40 mm high x 32 mm wide permanent Black digits on a White background. The Contractor shall install the lamacoid. The exact placement shall be at the centre of the front top horizontal channel of the rack, and at the top centre of the
- All fiber and copper patch panels shall be assigned an alpha-numeric ID number e.g. FP1, .3 VP1, P1, APP1, etc. The number shall be displayed in the form of a lamacoid label supplied by the Contractor. Each character shall be 12 mm high x 9 mm wide permanent Black digits on a White background. The Contractor shall install the lamacoid. The exact placement shall be at the left-side post of the rack and cabinet, beside the centre of the associated patch panel.
- .4 Unless specified otherwise, designation labels on outlet plates shall be machine-printed on tape and inserted in the top and bottom label windows of faceplates, as detailed in these and related specifications. Alternate methods must be submitted to the Communications

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Consultant and or the PHSA NE representative for approval. Lamacoid labels shall not be accepted.

- .5 After terminating and identifying a Communications cable, each cable shall be identified with a unique cable number, as detailed in these and related specifications. A sample database sheet for cable identification is included in Appendix A. The Contractor shall use the sample database format to populate cable information without any modification and provide one database file in same format for each building.
- .6 Labelling shall conform to standard faceplate drawing. Refer to C-STD drawings in 27 00
- .7 Commscope or Belden label strips or equal shall be approved by the Communications Consultant and or the PHSA NE Representative. The Contractor shall label each outlet with 9 mm high black on white mechanical label.
- .8 Unless specified otherwise, all labels shall be machine-printed. Brother "P-touch" electronic labelling system, or equal approved by the Communications Consultant and or the PHSA NE Representative. Hand-lettered labels shall not be accepted. Labels shall have a design life equal to or greater than that of the labeled component. They shall be resistant to the environmental conditions at the point of installation.
- .9 Distribution terminals shall use standard TIA colour coding on all terminations as follows:
  Green = Termination of network connection on the customer side of the demarcation point (Category 3 cable from the EF to MER).

White/Silver = Termination of cables originating from common equipment (PBXs, computers, LANs and multiplexers, Category 3 tie cable between VP1 patch panel and the GigaBIX).

Brown = Inter-building Backbone.

Purple = First-level Backbone. Riser/Backbone and between MER and TR's.

Blue = Stations served directly from TR's or MER's, i.e. horizontal wiring.

Grey = Second-level Backbone.

- .1 Faceplate Work Area (Refer to C-STD drawings in 27 00 00.01).
- .2 Faceplates shall have the following labels:
  - .1 Alpha-numeric ID of Communications room at top label window of faceplate e.g. XXX-01A.
  - .2 Architectural room number of Communications room at bottom of faceplate e.g. 1008.
  - .3 Jack ID directly above or below jack e.g. R1P1-01, R1P1-02.
- .10 Communications Rooms
  - .1 EF/MER/TR Communications Room ID Assignments
  - .2 All Communications rooms shall have unique alpha numeric numbers assigned, example "XXX-01A". The numbers and not the background shall be 50 mm high x 40 mm wide engraved on lamacoid in permanent Blue on Yellow background. It shall be placed on a visible location at the top of the GigaBIX wall whenever feasible and secured with screws at four corners. Contractor shall label Communications room in consultation with NE and Facilities Maintenance and Operations and in accordance with the following format:

B1A shall be basement level – representing 1st Communications room.

01A shall be 1st floor level – representing 1st Communications room.

02A shall be 2nd floor level – representing 1st Communications room.

03A shall be 3rd floor level – representing 1st Communications room.

03B shall then be the 3rd floor level – representing 2nd Communications room.

Label the MER with the appropriate floor number and the letter A. Then assign letters B, C etc. to the TR Communications rooms on the same floor starting at the MER and moving in sequence. On each successive floor, label the Communications room

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located directly above the MER with the letter A and then label the remaining local Communications rooms on that floor in sequence accordingly to the established flow.

- .11 Patch Cable and Icon Colours
  - All Copper patch cables shall be Grey. .1
  - Black is avoided as they get mixed up with power cords and are tough to see in the .2 black cabinets
- .12 Communications Racks
  - Communications racks shall be labelled at the top middle of the rack frame on the front as R1. The second rack shall be labelled as R2 and so on.
  - .2 The numbers and not the background shall be 50 mm high x 40 mm wide engraved on lamacoid in permanent White on Black background.
- .13 UTP Horizontal Cable
  - Communications horizontal cables shall be identified at each termination end with a unique number at the faceplate (outlet jack), at the patch panel and on both ends of the cable jacket.

Patch Panel in TR (originating end) XXX-01A-R1P1-01 i.e.

XXX Represents combined site/building code in campus setting or `

XXX-01A Represents MER 1st floor Communications room A.

Represents Rack #1. R1 Represents Panel #1. Ρ1 01 Represents Port #1.

Note:

The Architectural number of the destination room shall be added to the associated port on the front of the patch panel.

.2 Communications horizontal cables for wireless access points shall be identified at each termination end with a unique number at the faceplate (outlet jack), at the patch panel and on both ends of the cable lacket.

Patch Panel in TR (originating end)

XXX-01A-R1P1-01(WP)

Represents combined site/building code in campus setting or XXX standalone building code only.

XXX-01A Represents MER 1st floor Communications room A.

R1 Represents Rack #1. Ρ1 Represents Panel #1. 01 Represents Port #1.

Represents Wireless Access Point. (WP)

Note:

The Architectural number of the destination room shall be added to the associated port on the front of the patch panel

- .3 The unique number used to identify horizontal cables for wireless access points shall also be identified on the T-bar at the location of the ceiling outlet or, in the case of a solid ceiling, on the access hatch co-located with the ceiling outlet. The label used in this instance shall be black with white alpha numeric characters.
- Wireless Access Point Patch Panel Label (existing CAT6 installations) .4
  - .1 Label "APP1", "APP2", etc. on the patch panels for the termination of CAT6A Wireless Access Point Horizontal cabling only in existing CAT6 installations.
  - .2 Install "APP1", "APP2", etc. above the existing patch panel "P1".
  - .3 CAT6A and CAT6 shall not be mixed in the same patch panel.
  - .4 "APP1", "APP2", etc. shall not be used when all the cables are of the same Category.

XXX-01A-R1APP1-01 i.e.

> XXX-01A Represents MER 1st floor Communications room A.

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R1 Represents Rack #1.

APP1 Represents CAT6A Wireless Access Point Panel #1 in

existing CAT6 installations.

01 Represents Port #1.

## .14 Backbone Cabling

Along the corridors, provide a cable label every 10 m along the entire exposed run of the backbone cable as well as within 1 m of both sides of any wall and floor penetrations. Identify destination and originating Communications room number on each wrap around cable label.

- .1 Label can be arranged in two lines with the following format example: SBBL-01A SBAL-01A
- .2 Size of Font is to be as maximum possible, depending on the diameter of the cable.
- .2 Inside the MER, TR, or EF, all backbone cables after exiting conduits or conduit sleeves shall be labelled every 3 meters along the exposed section as well as within 1 meter of each side of a wall or floor slab the cable passes through. The wrap around labelling also applies to the fiber slack storage ring and the inner duct (from ring to rack), for the fiber cable.
- .3 Voice Riser Copper
  - .1 The first GigaBIX mount on the lower half of the GigaBIX field shall be reserved for Entrance cables.
  - .2 When the Contractor has been instructed to install multiples of 25 pair CAT. 3 UTP cable in the Riser/Backbone from MER to each of the TR's, these Backbone cables shall be identified at both ends and on the GigaBIX designation strips.
    - .1 On the GigaBIX designation strip, the Riser/Backbone cable number shall appear sequentially starting at "V1-001" at the top left-hand corner of the second GigaBIX mount (lower half of the GigaBIX wall). Next mount shall continue the sequence. A spare mount shall be installed for growth.
      - i.e. XXX-01A/XXX-02A-V1(1-100).

XXX-01A Represents from MER 1st floor Communications

room A.

XXX-02A Represents to TR 2nd floor Communications room

Α.

V1 Represents first voice Backbone cable.

1–100 Represents cable pairs 1 to 100 within cable V1.

- .3 Voice tie cables (25 pair bundles) from the rack to the GigaBIX shall be terminated on 24-port patch panels and label as VP1, VP2, etc. in the rack and shall appear sequentially starting at the top left-hand corner of the first mount (upper half of the GigaBIX wall). Next mount shall continue the sequence. A spare GigaBIX mount shall be reserved for growth.
- .4 Voice Patch Panel label
  - i.e. XXX-01A-R1VP1-01

XXX-01A Represents MER 1st floor Communications room A.

R1 Represents Rack #1.

VP1 Represents Voice Panel #1.

01 Represents Port #1.

GigaBIX Designation Strip Label

i.e. XXX-01A-R1VP1(1-25) XXX-01A-R1VP2(1-25) XXX-01A-R2VP1(1-25)

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### XXX-01A-R2VP2(1-25)

- .4 ISP Backbone Cable Labels
  - .1 General: machine printable labels with a laser printer, thermal transfer printer, or hand-held printer and adhesive backed and having a self-laminating feature.
  - .2 Printable area: 50 mm (2") x 12 mm (0.5") minimum.
  - .3 Colour: White
    - .1 Laser labels for cable diameters 4.06mm 8.13mm white.
    - .2 Labels for cable diameters 7.87mm 17.5mm, white.
    - .3 Labels for cable diameters 7.87mm 36mm white.
- .5 GigaBIX Labels
  - 1 General: machine printable labels with a laser printer, thermal transfer printer, or hand-held printer and adhesive backed and having a self-laminating feature.
  - .2 Colour: Purple for 1<sup>st</sup> level backbone termination field; Grey for 2<sup>nd</sup> level backbone termination field.

#### .6 Fiber

.1 When the Contractor has been instructed to install OM5 Multimode fiber cable from the MER to each TR, each end of the cable and termination panel shall be labelled with a unique number. For example:

#### Fiber Cable Label

Fibei	r Cable Label			
i.e.	e. XXX-01A-R2FP3.1-F1/XXX-02B-R1FP1.4-F1(24 OM5)			
	XXX	Represents building code		
	01A	Represents from 1st Floor Communications		
		Room A		
	R2	Represents Rack 2		
	FP3.1	Represents Fiber Panel 3, Module Bay 1		
	F1	Represents Fiber Cable 1		
	1	Represents between the originating and		
		terminating Communications Rooms		
	XXX	Represents building code		
	02B	Represents to 2nd Floor Communications Room		
		В		
	R1	Represents Rack 1		
	FP1.4	Represents Fiber Panel 1, Module Bay 4		
	F1	Represents Fiber Cable 1		
	(24 OM5)	Represents 24 strands OM5 Cable		
Fibe	r Panel Label			
i.e.	XXX-01A-R1FP1			
	XXX-01A	Represents MER 1st floor Communications		
		room A.		
	R1	Represents Rack 1.		
	FP1	Represents Fiber Panel 1.		

### .15 Telecommunications Ground

Bonding conductors shall be identified on both ends of the conductors, with data plate cable marker completed with double straps, to indicate where the destination end of the conductor is located.

TBB Cable Label

SBBL-01A-TMGB/SBBL-04A-TGB

Bonding Conductor from Busbar to and Object

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- SBBL-01A-TMGB/Object e.g. building steel, cable trays, etc. at both ends prior to conductor routed into its termination.
- .2 Label TBB every 6 m and within 1 m of both sides of any wall and floor penetrations with the description: "Communications Ground Only" The lettering size is 6 mm white on green background.
- .3 Examples of Telecommunications Ground Bar Labelling TMGB Busbar Label SBBL-01A-TMGB TGB Busbar Label SBBL-01B-TGB
- .16 Communications Conduits. Pull Boxes and Junction Boxes
  - ldentify all conduits, raceways, pull boxes, and junction boxes using painted colour bands. Colouring scheme shall be determined by the Authority at a later date. Provide all power and communication systems with unique colours in accordance with the colouring scheme. Major colour to be 100 mm wide and minor colour to be 50 mm wide. Identify raceways with coloured bands (using either spray paint or coloured duct tape) at intervals of 6 m, plus at the point where the raceway enters a wall or floor (i.e. raceway is identified on both sides of a penetration to facilitate tracing of raceway).
  - .2 Colour-code all junction boxes using spray paint on the cover. Neatly identify the relevant system and circuit ID using permanent marker pen. Identify parallel conduit runs at common locations.
- .17 Vendor Equipment Label
  - All FMO and 3rd party wall-mount or rack-mount (Vendor rack) equipment inside Communications spaces shall be clearly labelled on lamacoid with owner's department name and application information e.g. FMO Panic/Duress.
  - The variety of low voltage equipment shall include but is not limited to Overhead Paging, CATV/IPTV, Security Systems (Access Control, Intrusion Detection, CCTV, Panic Duress), Audio/Visual (Video Conferencing), Distributed Antenna System (DAS), Public Address, Clock System, BMS, Nurse Call, Intercom Systems, RFID Based Systems, Biomedical Systems (Physiological Monitoring, Telemetry), and Interactive Patient Infotainment System.
  - .3 The information will be displayed in the form of a lamacoid label supplied and installed by 3rd party equipment Vendor. The exact placement of the label will be on the front surface of the wall-mount panel or on the top surface of a rack-mount equipment to maximize visibility.
  - .4 The numbers and not the background shall be 9 mm high engraved on lamacoid in permanent Black on White background.
  - .5 Examples of a 3<sup>rd</sup> party Vendor equipment label ID:
    - .1 IPS Door Access 1, IPS Door Access 2, etc.
    - .2 FMO Panic Duress
- .18 For Identification for Biomedical Patched Cables, refer to Appendix G.1.
- .19 For Identification for Copper and Fiber Patched Cables, refer to Appendix G.2.
- .20 For Identification for Wireless Access Points and Network Switches, refer to Appendix G.3.

#### **END OF SECTION 27 05 53**

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#### 27 08 11.01 TESTING FOR COMMUNICATIONS FIBER

P	Α	RT	1	GENERAL
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#### 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 Overview
- .4 Testing
- .5 Test Results Documentation
- .6 Work Included
- .7 Fiber Quality Assurance

## 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 11 00 Communication Room Fittings
  - .3 Section 27 13 23 Fiber Backbone Systems

#### 1.3 OVERVIEW

- .1 Test equipment shall be approved by the Communications Consultant and or the PHSA NE Representative in writing before it can be used to test the structured cabling systems.
- .2 Final details of all test parameters, scope, and methodology to be performed by the Contractor, as described in this section, shall be verified with the Communications Consultant and or the PHSA NE Representative.
- .3 All terminations shall be completed and all Communications equipment installed before the tests are performed.
- .4 The installation shall be tested in the presence of the Communications Consultant and or the PHSA NE Representative when requested.

#### 1.4 TESTING

- .1 The maximum fiber optic connector loss allowable is 0.5 Db. Note this includes the fusion splice on the connector for connection to the fiber strand.
- .2 Measured results shall be within PHSA's maximum loss budget calculations. Correct improper splices and replace damaged cables or connectors at no cost to the Owner.
- Optical Loss Testing Contractor shall set up their Fluke OLTS in custom settings with the maximum loss parameters identified in these specifications for MPO, LC and Fiber cable. Tester Pass or Fail results shall be based on the Project Specifications for maximum dB loss which is 0.50 dB per mated pair of connectors, not the Industry Standards of a maximum 0.75 dB loss for mated pairs.

### 1.5 TEST RESULTS DOCUMENTATION

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- .1 Test results saved within the field-test instrument shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of the test records. These test records shall be uploaded to the PC unaltered, i.e., "as saved in the field-test instrument". For the purposes of review only, the contractor shall transfer field test results into a spreadsheet. The connector loss at both ends of the fiber link along with the fiber strand loss shall be used by the Communications Consultant and or the PHSA NE Representative to determine pass or fail. The OTDR test results shall be used to determine whether each connector of a fiber link is within the maximum of 0.5 dB loss level.
- .2 The database for the complete project, including twisted-pair copper cabling links, if applicable, shall be stored and delivered on USB key prior to Owner acceptance of the building. This USB key shall include the software tools required to view, inspect, and print any selection of the test reports.
- .3 Circuit IDs reported by the test instrument shall match the specified label ID.
- .4 The detailed test results documentation data is to be provided in an electronic database for each tested optical fiber and shall contain the following information:
  - .1 The identification of the customer site as specified by the end-user.
  - .2 The name of the test limit selected to execute the stored test results.
  - .3 The name of the personnel performing the test.
  - .4 The date and time the test results were saved in the tester's memory.
  - .5 The manufacturer, model and serial number of the field-test instrument.
  - .6 The version of the test software and the version of the test limit database held within the test instrument.
  - .7 The fiber identification number.
  - .8 The length for each optical fiber.
  - .9 Optionally the index of refraction used for length calculation when using a length capable OLTS.
  - .10 Test results to include OLTS attenuation link and channel measurements at the appropriate wavelength(s) and the margin (difference between the measured attenuation and the test limit value).
  - .11 Test results to include OTDR link and channel traces, tables at the appropriate wavelength(s).
  - .12 The length for each optical fiber as calculated by the OTDR.
  - .13 The overall Pass/Fail evaluation of the link-under-test for OLTS and OTDR measurements.

## 1.6 WORK INCLUDED

- .1 Provide all labour, materials, tools; field-test instruments and equipment required for the complete testing, identification and administration of the work called for in the Contract Documents.
- .2 In order to conform to the overall project event schedule, the cabling contractor shall monitor work progress and coordinate cable testing with other applicable trades.
- .3 In addition to the tests detailed in this document, the contractor shall notify the Communications Consultant and or the PHSA NE Representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional test results at no additional charge.

#### 1.7 FIBER QUALITY ASSURANCE

.1 All testing procedures and field-test instruments shall comply with applicable requirements of:

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- .1 ANSI Z136.2, ANS for Safe Use of Optical Fiber Communications Systems Utilizing Laser Diode and LED Sources.
- .2 ANSI/TIA-455 50B, Light Launch Conditions for Long-Length Graded-Index Optical Fiber Spectral Attenuation Measurements.
- .3 ANSI/TİA-455-59A, Measurement of Fiber Point Discontinuities Using an OTDR.
- .4 ANSI/TIA-455 60A, Measurement of Fiber or Cable Length Using an OTDR.
- .5 ANSI/TIA-455 61A, Measurement of Fiber or Cable Attenuation Using an OTDR.
- .6 ANSI/TIA-526-7-A (2015), Optical Power Loss Measurements of Installed Single-mode Fiber Cable Plant.
- .7 ANSI/TIA-526-14-C (2015), Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant.
- .8 ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard, Part 1, General Requirements.
- .9 ANSI/TIA-568-C.3, Optical Fiber Cabling Components Standard.
- .10 ANSI/TIA-TSB-140, Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.
- .11 ANSI/TIA-606B, Administration Standard for Commercial Telecommunications Infrastructure, including labelling requirements specified by PHSA.
- .2 Trained technicians who have successfully attended an appropriate training program, which includes testing with an OLTS and an OTDR and have obtained a certificate as proof thereof shall be allowed to execute the tests. These must be issued by any of the following organizations or an equivalent organization:
  - .1 Manufacturer of the Fiber optic cable and/or the Fiber optic connectors.
  - .2 Manufacturer of the test equipment used for the field certification.
  - .3 BICSI and its authorized training partners.
- .3 The Communications Consultant and or the PHSA NE representative shall be invited to witness and/or review field-testing.
  - The Communications Consultant and or PHSA NE representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
  - .2 The Communications Consultant and or PHSA NE representative shall select a random sample of 5% of the installed links. The Communications Consultant and or the PHSA NE Representative shall witness the testing of these randomly selected links and the results are to be stored in accordance with this document. The results obtained shall be compared to the original data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the Communications Consultant and or the PHSA NE Representative shall repeat 100% testing at no cost to the Owner.

#### PART 2 PRODUCTS

#### 2.1 OPTICAL FIBER CABLE TESTERS

- .1 The field-test instrument shall be within the calibration period (12 months) recommended by the manufacturer.
- .2 Optical loss test set (OLTS).
  - .1 Multimode optical fiber light source
    - .1 Provide dual LED light sources with central wavelengths of 850 nm  $(\pm 30 \text{ nm})$  and 1300 nm  $(\pm 20 \text{ nm})$ .
    - .2 Output power of –20 dBm minimum.

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- .3 The light source shall meet the launch requirements of ANSI/TIA-455-50B, Method A. This launch condition can be achieved either within the field test equipment or by use of an external mandrel wrap (as described in clause E.7 of ANSI/TIA-568-C.0) with a Category 1 light source.
- .4 Acceptable manufacturers
  - .1 Fluke Networks.
- .2 Singlemode optical fiber light source
  - .1 Provide dual laser light sources with central wavelengths of 1310 nm (±20 nm) and 1550 nm (±20 nm).
  - .2 Output power of –10 dBm minimum.
  - .3 Acceptable manufacturers
    - .1 Fluke Networks.
- .3 Power Meter
  - .1 Provide 850 nm, 1300/1310 nm, and 1550 nm wavelength test capability.
  - .2 Power measurement uncertainty of  $\pm$  0.25 dB.
  - .3 Store reference power measurement.
  - .4 Save at least 100 results in internal memory.
  - .5 PC interface (serial or USB).
  - .6 Acceptable manufacturers
    - .1 Fluke Networks.

## 2.2 OPTICAL TIME DOMAIN REFLECTOMETER (OTDR)

- .1 Multimode OTDR
  - .1 Wavelengths of 850 nm ( $\pm$  10 nm) and 1300 nm ( $\pm$  15 nm).
  - .2 Event dead zones of 0.5 m typical at 850 nm and 0.7 m typical at 1300 nm.
  - .3 Attenuation dead zones of 2.2 m typical at 850 nm and 4 m typical at 1300 nm.
  - .4 Distance range not less than 8 km at 850 nm and 35 km at 1300 nm.
  - .5 Dynamic range 28 dB typical at 850 nm and 1300 nm.
- .2 Singlemode OTDR
  - .1 Wavelengths of 1310 nm ( $\pm$  25 nm) and 1550 nm ( $\pm$  30 nm).
  - .2 Event dead zones of 0.6 m maximum at 1310 nm and 1550 nm.
  - .3 Attenuation dead zones of 4 m typical at 1310 nm and 1550 nm.
  - .4 Distance range not less than 130 km at 1550 nm and 80 km at 1310 nm.
  - .5 Dynamic range 30 dB typical at 1310 nm and 1550 nm.
  - .6 Acceptable manufacturers
    - .1 Fluke Networks.
- .3 Fiber Microscope
  - .1 Magnification of 200X or 400X for end-face inspection
  - .2 Acceptable manufacturers
    - .1 Fluke Networks.

## PART 3 EXECUTION

### 3.1 FIBER TESTING

.1 Initially test every fiber strand within the Fiber optic cable with a light source and power-meter utilizing procedures as stated in ANSI/TIA -526-14-C, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant, and ANSI/TIA-526-7-A (currently Standard Proposal Number 2974-B): OFSTP-7 Measurement of Optical Power Loss of Installed Single-mode Fiber Cable Plant. Measured results shall be within manufacturers' cable and PHSA's loss budget calculations.

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- .1 This includes testing the attenuation and polarity of the installed cable plant with an optical loss test set (OLTS) and the installed condition of the cabling system and its components with an optical time domain reflectometer (OTDR). The condition of the fiber end faces shall also be verified.
- .2 Testing shall be performed on each cabling link (connector to connector).
- .3 Testing shall be performed on each cabling channel (equipment to equipment) that is identified by the Communications Consultant and or the PHSA NE Representative where required.
- .4 Testing shall not include any active devices or passive devices within the link or channel other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.
- .5 All tests shall be documented including OLTS dual wavelength attenuation measurements for multimode and singlemode links and channels and OTDR traces and event tables for multimode and singlemode links and channels.
- .6 Field-test instruments shall have the latest software and firmware installed.
- .7 Link and channel test results from the OLTS and OTDR shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative (reports) may be generated.
- .8 Fiber end faces shall be inspected at 250X or 400 X magnifications. 250X magnification shall be used for inspecting multimode and single-mode fibers. 400X magnification shall be used for detailed examination of single-mode fibers. Scratched, pitted or dirty connectors shall be diagnosed and replaced at no cost to the Owner.
- .9 It is mandatory that the end face images be recorded in the memory of the test instrument for subsequent uploading to a PC and reporting.
- .10 Testing of the cabling shall be performed using high-quality test cords of the same Fiber type as the cabling under test. The test cords for OLTS testing shall be between 1 m and 5 m length, maximum 0.1 dB loss for multimode, and 0.2 dB loss for singlemode. The test cords for OTDR testing shall be approximately 100 m for the launch cable and at least 25 m for the receive cable.
- .11 All tests performed on optical fiber cabling that use a laser or LED in a test set shall be carried out with safety precautions in accordance with ANSI Z136.2.
- .12 All outlets, cables, patch panels and associated components shall be fully assembled and labelled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work. The following test parameters shall be adhered to:
  - .1 Multimode fiber optic cables shall be tested at 850 nm and 1300 nm.
  - .2 Single-mode fiber optic cables shall be tested at 1310 nm and 1550 nm.
  - .3 Testing procedures shall utilize "Method B" one jumper reference.
  - .4 Fiber testing
    - .1 Tier 1: Attenuation testing using Optical Loss Test Set (OLTS). For horizontal cabling, one direction and one wavelength. For backbone cabling, two directions and both wavelengths.
    - .2 Tier 2: Trace using Optical Time Domain Reflectometer (OTDR). For all cabling, one direction and both wavelengths.
  - .5 Test every strand of fiber with an OTDR.
  - .6 Fiber links shall be tested with test equipment based on laser light sources categorized by a Coupled Power Ratio (CPR) of Category 2, under filled, as per IEC 60825-2.
  - .7 This rule shall be followed to support Gigabit Ethernet applications.
  - .8 Gigabit Ethernet only specifies laser light sources and not LED (light emitting diode) light sources. Field test equipment based on LED light sources is a Category 1 device as per IEC 60825-2 and typically yields high attenuation results.

.9 For Gigabit Ethernet compliant certification (IEEE std 802.3z application), use

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Test equipment which uses a VCSEL (Vertical Cavity Surface Emitting Laser) at 850 nm (compliant with 1000BASE-SX) and an FP laser at 1310 nm (compliant with 1000BASELX).

#### 3.2 ACCEPTANCE OF FIBER TEST RESULTS

- Application drive distance assurance must be completed at the design draft phase. The RCDD designer shall calculate the link loss budgets using the Manufacturer Link Loss calculator. The results from this shall be supplied to the cabling Contractor to ensure the installed link or channel conforms to the designed attenuation specification when performing the testing. The results of the proposed links from the Manufacturer link loss calculator and the final passing results from the fiber tester shall be included in the test results documentation.
- .2 Unless otherwise specified by the Communications Consultant and or PHSA NE Representative, each cabling link shall be in compliance with the following test limits:
  - .1 Optical loss testing
    - .1 Multimode and Singlemode links
      - .1 The link attenuation shall be calculated by the following formulas as specified in ANSI/TIA-568-C.0.
        - .1 Link Attenuation (dB) = Cable\_Attn (dB) + Connector\_Attn (dB) + Splice Attn (dB)
        - .2 Cable\_Attn (dB) = Attenuation\_Coefficient (dB/km) \* Length (Km)
        - .3 Connector\_Attn (dB) = number\_of\_connector\_pairs \* connector\_loss (dB)
        - .4 Maximum allowable connector loss = 0.50 dB
        - .5 Splice Attn (dB) = number of splices \* splice loss (dB)
        - .6 Maximum allowable splice loss = 0.03 dB
        - .7 The values for the Attenuation\_Coefficient (dB/km) are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation coefficient (dB/km)	Wavelength (nm)	Attenuation coefficient (dB/km)
Multimode 62.5/125 µm	850	3.5	1300	1.2
Multimode 50/125 µm OM2	850	3.5	1300	1.2
Multimode 50/125 µm OM3	850	3.25	1300	1.0
Multimode 50/125 µm OM4	850	3.0	1300	1.0
Multimode 50/125 µm OM5	850	3.0	1300	1.5
Single-mode (Inside plant)	1310	0.5	1550	0.5
Single-mode (Outside plant)	1310	0.5	1550	0.5

- .3 OTDR testing
  - .1 Reflective events (connections) shall not exceed 0.5 dB.
  - .2 Non-reflective events (splices) shall not exceed 0.3 dB.
  - .3 Fiber links shall be tested at the appropriate operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss.
  - .4 Multimode: 850 nm and 1300 nm
  - .5 Singlemode: 1310 nm and 1550 nm
  - .6 Each fiber link and channel shall be tested in both directions.

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- .7 A launch cord shall be installed between the OTDR and the first link connection.
- .8 A tail cord shall be installed after the last link connection
- .4 Magnified end-face inspection
  - .1 Fiber connections shall be visually inspected for end-face quality.
  - .2 Scratched, pitted or dirty connectors shall be diagnosed and corrected.
- .5 All installed cabling links and channels shall be field-tested and pass the test requirements and analysis. Any link or channel that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected link or channel meets performance requirements. The final and passing result of the tests for all links and channels shall be provided in the test results documentation.
- Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the Communications Consultant and or the PHSA NE Representative.

**END OF SECTION 27 08 11.01** 

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#### 27 08 11.02 TESTING FOR COMMUNICATIONS CATEGORY 3

#### PART 1 GENERAL

#### 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 Description
- .4 Quality Assurance
- .5 Codes Standards and Guidelines
- .6 Submittals
- .7 Identification
- .8 Definitions
- .9 Warranty

#### 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 11 00 Communication Room Fittings
  - .3 Section 27 13 13 Copper Backbone Systems
  - .4 Section 27 16 00 Connecting Cords, Devices and Adaptors

### 1.3 DESCRIPTION

- .1 The work covered by this section of the Specifications includes all labour necessary to perform and complete such construction, all materials and equipment incorporated or to be incorporated in such construction and all services, facilities, tools and equipment necessary or used to perform and complete such construction. The work of this section shall include, but is not limited to, the following:
  - .1 Cable testing for copper cables.
  - .2 Providing testing results in accordance with the strictest manufacturers' written recommendations.

#### 1.4 QUALITY ASSURANCE

.1 Refer to Section 27 00 00 for general details.

### 1.5 CODES, STANDARDS AND GUIDELINES

- .1 Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations in Section 27-00-00.
- .2 The PHSA representative, Telecommunications Standards Document and the Labelling, Design and Syntax Standards. Circuit IDs reported by the test instrument shall match the specified label ID.

## 1.6 SUBMITTALS

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- .1 Refer to Section 27-00-00 for general details.
- .2 B. Shop Drawings:
  - .1 None Required
- .3 Submit Manufacturer's Cut Sheets for the following:
  - .1 Any products not specifically listed in the PRODUCTS section shall require a submittal of the manufacturer's cut sheets and approval by the PHSA representative group.
- .4 List of test equipment to be used.
- .5 Sample of test data to be provided to the PHSA representative prior to the start of testing for review, comment and acceptance.
- .6 Identity and qualifications of Contractor's personnel who will perform the testing.
- .7 Submit the proposed schedule for performing testing at least 2 weeks prior to the start of testing.

#### 1.7 IDENTIFICATION

.1 For details, refer to Section 27-05-53 Labelling and BICSI Design Standards.

#### 1.8 DEFINITIONS

.1 N/A

#### 1.9 WARRANTY

.1 Refer to Section 27 00 00 for general details.

#### PART 2 PRODUCTS

#### 2.1 CATEGORY 3 CABLE TESTERS

- .1 Testing for all cables 25 pair or larger are to use a tester that tests 4 pairs at a time.
- .2 The field tester must meet the requirements of ANSI/TIA/EIA-568.
- .3 Make and model to be submitted for approval by the PHSA representative prior to start of testing.

#### PART 3 EXECUTION

#### 3.1 GENERAL

- .1 The Contractor shall test, as described below, all metallic cables installed under these specifications.
- .2 Visually inspect all cables, cable reels, and shipping cartons to detect cable damage incurred during shipping and transport. Return visibly damaged items to the manufacturer.
- .3 Where post-manufacturer test data has been provided by the manufacturer on the reel or shipping carton: Submit 2 copies to the PHSA representative prior to installing cables.
- .4 Test fully completed systems only. Piecemeal testing is not acceptable.
- .5 Testing shall not be performed until after all termination hardware is installed and attached, and all labelling and identification has been completed. If all work is not

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- completed prior to testing, test data will be considered not acceptable and shall be redone and resubmitted.
- .6 Any cable that does not pass all required testing shall be removed, replaced, and retested.
- .7 Remove and replace any defective cables from pathways system. Do not abandon cables in place.
- .8 For 100 pair or smaller replace entire cable if a pair or conductor fails a required test. For larger pair count cables, replace if more than 2% of pairs fail a required test.
- .9 The PHSA reserves the right to observe all portions of the testing process.
- .10 The PHSA representative further reserves the right to conduct "Proof of performance testing," using Contractor equipment and labour. This shall be a random re-test of up to ten percent (10%) of the cable plant to confirm documented test results. If multiple errors are found, test percentages shall rise.
- .11 Perform all tests as required by the manufacturer in support of the structured cabling system warranty

#### 3.2 QUANTITIES

.1 N/A

#### 3.3 INSTALLATION

.1 N/A

#### 3.4 GROUNDING AND BONDING

.1 All grounding and bonding is to be complete before any system testing is to be attempted.

#### 3.5 TESTING

- .1 All test results are to be defined as acceptable / unacceptable using the requirements of ANSI/TIA/EIA568 B.
- .2 Copper Cables General Requirements
  - .1 After terminating and splicing all cables, test all cable pairs for:
    - .1 Continuity to the remote end.
    - .2 Shorts between any 2 or more conductors or ground
    - .3 Transposed pairs
    - .4 Reversed Pairs
    - .5 Split Pairs
    - .6 Crossed Pairs
    - .7 Wire map.
    - .8 Length.
    - .9 Shield Continuity (If Shielded)
    - .10 Continuity to Grounding (If Shielded)
  - .2 Using a (low ohm) multimeter, test continuity to ground (TGB or TMGB) for a maximum resistance of 1Ω, see section 27-05-26 for additional detail.
- .3 Indoor Riser or OSP Copper Cable
  - .1 After terminating and splicing the cables. Test all cable pairs for:
    - .1 DC Loop Resistance for any 2 conductors in the cable

## 3.6 ACCEPTANCE

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- .1 All test results for CAT 3 cable are to be documented and submitted in the Manufacturer's native format to the PHSA representative (both in a binder and electronically) within five (5) working days of test completion. Alternate reporting software may be used if the associated software (with license if required) is given to PHSA. (Software not to be returned)
- .2 All test results for CAT 63 cable to be documented and submitted in Fluke LinkWare format to the PHSA representative electronically within five (5) working days of test completion. Alternate reporting software may be used if the associated software (with license if required) is given to PHSA. (Software not to be returned)
- .3 Test result shall be recorded per cable and three identical copies placed on removable media (CD) for delivery to the PHSA representative for review and acceptance. If test results are found acceptable, the PHSA shall inform the Project Manager in writing or by email.
- .4 Each test report shall contain the following general information:
  - .1 Date of Preparation.
  - .2 Date of Test.
  - .3 Project Name (PHSA building number).
  - .4 Contractor's Name
  - .5 Media Type.
  - .6 Make, Model and Serial Number of test equipment used.
  - .7 Date of Last Calibration.
  - .8 Names of Test Crew.
- .5 In addition to the results of the specific tests specified, reports shall also include:
  - .1 Cable ID Number (See the PHSA Labelling, Design Standards).
  - .2 Cable Type.
  - .3 Pair or Conductor Count.
  - .4 Individual Pair or Conductor Numbers.
  - .5 Results of Each Test for Each Pair or Conductor.
  - .6 Total Number of Serviceable Pairs or Conductors in Cable.
  - .7 Ground Resistance Measurements.
- Once the testing has been completed and the PHSA representative is satisfied that all work is in accordance with the Contract Documents, the PHSA representative will notify the Contractor and/or Project Manager in writing or via email.

**END OF SECTION 27 08 11.02** 

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#### 27 08 11.03 TESTING FOR HORIZONTAL CATEGORY 6 AND 6A

PART 1 GENER	AL
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### 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 Work included
- .4 Scope
- .5 Quality assurance
- .6 Submittals
- .7 Acceptance of test results

#### 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 11 00 Communications Room Fittings
  - .3 Section 27 15 00 Horizontal Cabling
  - .4 Section 27 16 00 Connecting Cords, Devices and Adaptors
  - .5 Section 27 21 33 Data Communications Wireless Access Points

#### 1.3 WORK INCLUDED

- .1 Provide all labour, materials, tools, field-test instruments and equipment required for the complete testing, identification and administration of a Horizontal Category 6 or 6A cabling system.
- .2 The cabling contractor shall survey the work areas and coordinate cabling testing with other applicable trades.
- .3 In addition to the tests detailed in this document, the contractor shall notify the Communications Consultant and or the PHSA NE Representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional measurement results at no additional charge.

#### 1.4 SCOPE

- .1 This Section includes the minimum requirements for the test certification of horizontal Category 6 and 6A balanced twisted pair cabling.
- .2 This Section includes minimum requirements for:
  - .1 Copper cabling test instruments
  - .2 Copper cabling testing
  - .3 Administration
    - .1 Test results documentation
    - .2 As-built drawings
- .3 Testing shall be carried out in accordance with this document.
- .4 Testing shall be performed on each cabling link. (100% testing)
- .5 All tests shall be documented.

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#### 1.5 QUALITY ASSURANCE

- .1 All testing procedures and field-test instruments shall comply with applicable requirements of:
  - .1 ANSI/TIA-1152, Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  - .2 ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises.
  - .3 ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard
  - .4 ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
  - .5 ANSI/TIA-606-B, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by PHSA.
- .2 Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
  - .1 Manufacturer of the connectors or cable.
  - .2 Manufacturer of the test equipment used for the field certification.
  - .3 Training organizations (e.g., BICSI, A Telecommunications Association headquarters in Tampa, Florida; ACP [Association of Cabling Professionals™] Cabling Business Institute located in Dallas, Texas).
- .3 The Communications Consultant and or the PHSA NE representative shall be invited to witness and/or review field-testing.
  - The Communications Consultant and or PHSA NE representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
  - .2 The Communications Consultant and or the PHSA NE representative shall select a random sample of 5% of the installed links. The Communications Consultant and or the PHSA NE Representative shall witness the testing of these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the original data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the Communications Consultant and or the PHSA NE Representative shall repeat 100% testing at no cost to the Owner.

#### 1.6 SUBMITTALS

.1 Refer to Section 27 05 00.

#### 1.7 ACCEPTANCE OF TEST RESULTS

- .1 Unless otherwise specified by the Owner or the Owners representative, each Category 6Acabling link shall be in tested for:
  - .1 Wire Map
  - .2 Length
  - .3 Propagation Delay
  - .4 Delay Skew
  - .5 DC Loop Resistance recorded for information only
  - .6 DC Resistance Unbalance recorded for information only
  - .7 Insertion Loss
  - .8 NEXT (Near-End Crosstalk)
  - .9 PS NEXT (Power Sum Near-End Crosstalk)
  - .10 ACR-N (Attenuation to Crosstalk Ratio Near-End) recorded for information only

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- .11 PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End) recorded for information only
- .12 ACR-F (Attenuation to Crosstalk Ratio Far-End)
- .13 PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
- .14 Return Loss
- .15 TCL (Transverse Conversion Loss) recorded for information only
- .16 ELTCTL (Equal Level Transverse Conversion Transfer Loss) recorded for information only
- .17 PS ANEXT (Power Sum Alien Near-End Crosstalk) sampled per section 3.2
- .18 Average PS ANEXT (Average Power Sum Alien Near-End Crosstalk) sampled per section 3.2
- .19 PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End) sampled per section 3.2
- .20 Average PS AACR-F (Average Power Sum Alien Attenuation to Crosstalk Ratio Far-End) sampled per section 3.2
- .2 Unless otherwise specified by the Owner or the Owners representative, each Category 6 cabling link shall be in tested for:
  - .1 Wire Map
  - .2 Length
  - .3 Propagation Delay
  - .4 Delay Skew
  - 5 DC Loop Resistance recorded for information only
  - .6 DC Resistance Unbalance recorded for information only
  - .7 Insertion Loss
  - .8 NEXT (Near-End Crosstalk)
  - .9 PS NEXT (Power Sum Near-End Crosstalk)
  - .10 ACR-N (Attenuation to Crosstalk Ratio Near-End) recorded for information only
  - .11 PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End) recorded for information only
  - .12 ACR-F (Attenuation to Crosstalk Ratio Far-End)
  - .13 PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
  - .14 Return Loss
  - .15 TCL (Transverse Conversion Loss) recorded for information only
  - .16 ELTCTL (Equal Level Transverse Conversion Transfer Loss) recorded for information only
- All installed cabling Permanent Links shall be field-tested and pass the test requirements and analysis as described in Part 3. Any Permanent Link that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected Permanent Link meets performance requirements. The final and passing result of the tests for all Permanent Links shall be provided in the test results documentation in accordance with Part 3.
- .4 Acceptance of the test results shall be given in writing after the project is fully completed and tested to the satisfaction of the Owner.

#### PART 2 PRODUCTS

#### 2.1 PRODUCTS

- .1 Balanced twisted-pair CABLE Testers
  - .1 The field-test instrument shall be within the calibration period recommended by the manufacturer, typically 12 months.

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#### .2 Certification tester

- .1 Accuracy
  - .1 Level Ille accuracy in accordance with ANSI/TIA-1152
  - .2 Independent verification of accuracy
  - .3 Acceptable manufacturers
    - .1 Fluke Networks
- .2 Permanent Link Adapters
  - .1 RJ45 plug must meet the requirements for NEXT, FEXT and Return Loss in accordance with ANSI/TIA-568-C.2 Annex C
  - .2 Twisted pair Category 5e, 6, 6A, 7 or 7<sub>A</sub> cords are not permitted as their performance degrades with use and can cause false Return Loss failures
- .3 Results Storage
  - .1 Must be capable of storing > 10,000 results for all measurements found in 2.1.B.4 below
- .4 Measurement capabilities
  - .1 Wire Map
  - .2 Length
  - .3 Propagation Delay
  - .4 Delay Skew
  - .5 DC Loop Resistance
  - .6 DC Resistance Unbalance
  - .7 Insertion Loss
  - .8 NEXT (Near-End Crosstalk)
  - .9 PS NEXT (Power Sum Near-End Crosstalk)
  - .10 ACR-N (Attenuation to Crosstalk Ratio Near-End)
  - .11 PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)
  - .12 ACR-F (Attenuation to Crosstalk Ratio Far-End)
  - .13 PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
  - .14 Return Loss
  - .15 TCL (Transverse Conversion Loss)
  - .16 ELTCTL (Equal Level Transverse Conversion Transfer Loss)
  - .17 Time Domain Reflectometer
  - .18 Time Domain Xtalk Analyser
  - .19 PS ANEXT (Power Sum Alien Near-End Crosstalk)
  - .20 Average PS ANEXT (Average Power Sum Alien Near-End Crosstalk)
  - .21 PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-Fnd)
  - .22 Average PS AACR-F (Average Power Sum Alien Attenuation to Crosstalk Ratio Far-End)
- .3 PC Software
  - .1 Windows® based.
  - .2 Must show when 3 dB and 4 dB rules are applied
  - .3 Re-certification capability, where results must have their Cable IDs suffixed with (RC).
  - .4 Built in PDF export no additional third party software permitted.
  - .5 Built-in statistical analysis.

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## PART 3 EXECUTION

#### 3.1 GENERAL

.1 All outlets, cables, patch panels and associated components shall be fully assembled and labelled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work.

#### 3.2 BALANCED TWISTED PAIR CABLE TESTING

- .1 Field-test instruments shall have the latest software and firmware installed.
- .2 Permanent Link test results including the individual frequency measurements from the tester shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation (reports) may be generated.
- .3 Permanent Link testing shall be performed on each cabling segment (connector to connector). Sampling is not acceptable.
- .4 Alien Crosstalk testing shall be performed using a sampling plan. An acceptance quality level (AQL) of 0,4 %, normal inspection, general inspection level I as defined in ISO 2859-1 for populations of up to 500,000 links shall be used. The following table represents this sampling level.

Installation size (No. of total links)	Sample size (No. of links to test)
3 – 33	100%
34 – 3,200	33
3,201 – 35,000	126
35,001 – 150,000	201
150,001 – 500,000	315

Disturbed (Victim) links chosen for Alien Crosstalk testing shall be an equal combination of short, medium and long links.

- .5 Permanent Link adapters made from twisted pair Category 5e, 6, 6A, 7 or 7A cords are not permitted as their performance degrades with use and can cause false Return Loss failures.
- .6 The installer shall build a reference link. All components shall be anchored so it is not possible to disturb them. The technician is to conduct a Category 6A Permanent Link test each day to ensure no degradation of the tester or its Permanent Link adapters.
- .7 Wire Map Measurement
  - The wire map test is intended to verify pin-to-pin termination at each end and check for installation connectivity errors. For each of the 8 conductors in the cabling, the wire map indicates:
    - .1 Continuity to the remote end
    - .2 Shorts between any two or more conductors
    - .3 Reversed pairs
    - .4 Split pairs
    - .5 Transposed pairs
    - .6 Distance to open on shield

.7 Any other miss-wiring

- .2 The correct connectivity of telecommunications outlets/connectors is defined in ANSI/TIA-568-C.2. T568A shall be used. The field tester shall use this colour scheme.
- .8 Length Measurement
  - .1 The length of each balanced twisted pair shall be recorded.
  - .2 Since physical length is determined from electrical length, the physical length of the link calculated using the pair with the shortest electrical delay shall be reported and used for making the pass or fail determination.
  - .3 The pass or fail criteria is based on the maximum length allowed for the Permanent Link as specified in ANSI/TIA-568-C.2 plus the nominal velocity of propagation (NVP) uncertainty of 10%. For a Permanent Link, the length measurement can be 325 ft. (99 m) before a fail is reported.
- .9 Propagation Delay measurement is the time it takes for a signal to reach the end of the link.
  - .1 The measurement shall be made at 10 MHz per ANSI/TIA-1152.
  - .2 The propagation delay of each balanced twisted pair shall be recorded.
  - .3 Is not to exceed 498 ns per ANSI/TIA-568-C.2 Section 6.3.18.
- .10 Delay Skew measurement is the difference in propagation delay @ 10 MHz between the shortest delay and the delays of the other wire pairs.
  - .1 The delay skew of each balanced twisted pair shall be recorded.
  - .2 Is not to exceed 44 ns per ANSI/TIA-568-C.2 Section 6.3.19.
- .11 DC Resistance
  - .1 Often reported as Resistance, is the loop resistance of both conductors in the pair.
  - .2 Is not specified in ANSI/TIA-1152, but shall be recorded for all four pairs.
- .12 DC Resistance Unbalance
  - Often reported as Resistance Unbalance, is the difference in resistance of the two wires within the pair.
  - .2 Is not specified in ANSI/TIA-1152 for a Permanent Link, but shall be recorded for all four pairs.
- .13 Insertion Loss is the loss of signal strength over the cabling (in dB).
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .2 Worst case shall be reported for all four pairs in one direction only.
  - .3 Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (\*).
  - .4 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.7.
- .14 NEXT (Near-End Crosstalk) is the difference in amplitude (in dB) between a transmitted signal and the crosstalk received on other wire pairs at the same end of the cabling.
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
    - .5 Shall be measured in both directions. (12 pair to pair possible combinations)
    - .6 Both worst case and worst margins shall be reported.
    - .7 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.8.
    - .8 Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (\*).

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- .9 The Time Domain Xtalk data shall be stored for any marginal or failing NEXT results.
- .15 PS NEXT (Power Sum Near-End Crosstalk) is the difference (in dB) between the test signal and the crosstalk from the other pairs received at the same end of the cabling.
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .2 Shall be measured in both directions. (8 pair possible combinations)
  - .3 Both worst case and worst margins shall be reported.
  - .4 Is not to exceed the Category 6 and 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.9.
  - .5 Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (\*).
  - .6 The Time Domain Xtalk data shall be stored for any marginal or failing PS NEXT results.
- .16 ACR-N (Attenuation Crosstalk Ratio Near-End) is a calculation of NEXT minus Insertion Loss of the disturbed pair in dB.
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .2 Shall be calculated in both directions.
  - .3 Is not specified in ANSI/TIA-1152, but shall be recorded for all 12 possible combinations.
- .17 PS ACR-N (Power Sum Attenuation Crosstalk Ratio Near-End) is a calculation of PS NEXT minus Insertion Loss of the disturbed pair in dB.
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .2 Shall be calculated in both directions.
  - .3 Is not specified in ANSI/TIA-1152, but shall be recorded for all 8 possible combinations.
- .18 ACR-F (Attenuation Crosstalk Ratio Far-End) is a calculation of FEXT minus Insertion Loss of the disturbed pair in dB.
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .2 Shall be measured in both directions. (24 pair to pair possible combinations)
  - .3 Both worst case and worst margins shall be reported.
  - .4 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.11.
  - .5 Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (\*).
- .19 PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End) is a calculation of PS FEXT minus Insertion Loss of the disturbed pair in dB.

.1 The frequency resolution shall be:

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- .1 1 31.25 MHz: 150 kHz
- .2 31.25 100 MHz: 250 kHz
- .3 100 250 MHz: 500 kHz
- .4 250 500 MHz: 1000 kHz
- .2 Shall be measured in both directions. (8 pair possible combinations)
- .3 Both worst case and worst margins shall be reported.
- .4 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.13.
- .5 Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (\*).
- .20 Return Loss is the difference (in dB) between the power of a transmitted signal and the power of the signals reflected back.
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .2 Shall be measured in both directions. (8 pair possible combinations)
  - .3 Both worst case and worst margins shall be reported.
  - .4 Shall be ignored at all frequencies where the Insertion Loss is less than 3 dB for that pair.
  - .5 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.6.
  - .6 Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (\*).
  - .7 The Time Domain Reflectometer data shall be stored for any marginal or failing Return Loss results.
- .21 TCL (Transverse Conversion Loss) is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the near-end on the same wire pair.
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .2 Shall be measured in both directions.
  - .3 Is not specified in ANSI/TIA-1152 for a Permanent Link, but shall be recorded for all 8 possible combinations.
- .22 ELTCTL (Equal Level Transverse Conversion Transfer Loss) is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the far end on the same wire pair minus the Insertion Loss of that pair.
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .2 Shall be measured in both directions.
  - .3 Is not specified in ANSI/TIA-1152 for a Permanent Link, but shall be recorded for all 8 possible combinations.
- .23 PS ANEXT (Power Sum Alien Near-End Crosstalk) (Category 6A)
  - .1 Takes into account the combined alien crosstalk (statistical) on a receive pair from all external near-end disturbers operating simultaneously.

.2 The frequency resolution shall be:

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- .1 1 31.25 MHz: 150 kHz
- .2 31.25 100 MHz: 250 kHz
- .3 100 250 MHz: 500 kHz
- .4 250 500 MHz: 1000 kHz
- .3 The disturbed (victim) link shall have links to the left and right of it and if present, links above and below it.
- .4 Disturber cables shall include all links within the same bundle as the disturbed (victim) link and adjacent links
- .5 Should be measured in both directions if the link is patch panel to patch panel. If the link is patch panel to telecommunications outlet, then it shall be measured from the patch panel end only.
- .6 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.21.
- .24 Average PS ANEXT (Power Sum Alien Near-End Crosstalk) (Category 6A) is calculated by averaging the individual PSANEXT loss values, in dB, for all four pairs in the disturbed (victim) link.
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .2 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.22.
- .25 PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End) (Category 6A)
  - AFEXT loss is the coupling of crosstalk at the far-end from external link pairs into a disturbed (victim) pair of the 4-pair link under test. PS AACR-F is the calculated power sum from all external pairs into the disturbed (victim) pair.
  - .2 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .3 The disturbed (victim) link shall have links to the left and right of it and if present, links above and below it.
  - .4 Disturber cables shall include all links within the same bundle as the disturbed (victim) link and adjacent links
  - .5 Should be measured in both directions if the link is patch panel to patch panel. If the link is patch panel to telecommunications outlet, then it shall be measured from the patch panel end only.
  - .6 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.25.
- .26 Average PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End)
  (Category 6A) is calculated by averaging the individual PS AACR-F values, in dB, for all four pairs in the disturbed (victim) link.
  - .1 The frequency resolution shall be:
    - .1 1 31.25 MHz: 150 kHz
    - .2 31.25 100 MHz: 250 kHz
    - .3 100 250 MHz: 500 kHz
    - .4 250 500 MHz: 1000 kHz
  - .2 The disturbed (victim) link shall have links to the left and right of it and if present, links above and below it
  - .3 Disturber cables shall include all links within the same bundle as the disturbed (victim) link and adjacent links

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- .4 Should be measured in both directions if the link is patch panel to patch panel. If the link is patch panel to telecommunications outlet, then it shall be measured from the patch panel end only.
- .5 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.26.

#### 3.3 ADMINISTRATION

#### .1 Test results documentation

- Test results saved within the field-test instrument shall be transferred into a Windows ™-based database utility that allows for the maintenance, inspection and archiving of the test records. These test records shall be uploaded to the PC unaltered, i.e., "as saved in the field-test instrument". The file format, CSV (comma separated value), does not provide adequate protection of these records and shall not be used.
- .2 Alien Crosstalk measurements shall be stored to a PC upon completion of the test.
- .3 The test results documentation shall be available for inspection by the Communications Consultant and or the PHSA NE Representative during the installation period and shall be passed to the Communications Consultant and or the PHSA NE Representative within 5 working days of completion of tests on cabling served by a telecommunications room or of backbone cabling. The installer shall retain a copy to aid preparation of as-built information.
- .4 The database for the complete project, including twisted-pair copper cabling links, if applicable, shall be stored and delivered on a USB thumb drive prior to Owner acceptance of the building. This USB thumb drive shall include the software tools required to view, inspect, and print any selection of the test reports.
- .5 Circuit IDs reported by the test instrument shall match the specified label ID. For Permanent Link testing, the detailed test results documentation data is to be provided in an electronic database for each tested balance twisted-pair and shall contain the following information:
  - .1 The overall Pass/Fail evaluation of the link-under-test
  - .2 The date and time the test results were saved in the memory of the tester
  - .3 The identification of the customer site as specified by the end-user
  - .4 The name of the test limit selected to execute the stored test results
  - .5 The name of the personnel performing the test
  - .6 The version of the test software and the version of the test limit database held within the test instrument
  - .7 The manufacturer, model and serial number of the field-test instrument
  - .8 The adapters used
  - .9 The factory calibration date
  - .10 Wire Map
  - .11 Propagation Delay values, for all four pairs
  - .12 Delay Skew values, for all four pairs
  - .13 DC Resistance values, for all four pairs
  - .14 DC Resistance Unbalance, values for all four pairs
  - .15 Insertion Loss, worst case values for all four pairs
  - .16 NEXT, worst case margin and worst case values, both directions
  - .17 PS NEXT, worst case margin and worst case values, both directions
  - .18 ACR-F, worst case margin and worst case values, both directions
  - .19 PS ACR-F, worst case margin and worst case values, both directions
  - .20 Return Loss, worst case margin and worst case values, both directions
  - .21 TCL, worst case values both directions
  - .22 ELTCTL, worst case values, both directions.

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- .23 Time Domain Crosstalk data if the link is marginal or fails
- .24 Time Domain Reflectometer data if the link is marginal or fails
- .6 For Alien Crosstalk testing, the detailed test results documentation data is to be provided in an electronic database for each tested balance twisted-pair and shall contain the following information
  - .1 The overall Pass/Fail evaluation of the link-under-test
  - .2 The date and time the measurements were made
  - .3 The identification of the customer site as specified by the end-user
  - .4 The name of the test limit selected to execute the stored test results
  - .5 The name of the personnel performing the test
  - .6 The version of the test software
  - .7 PS ANEXT, worst case margin for all four pairs
  - .8 Average PS ANEXT, worst case margin
  - .9 PS AACR-F, worst case margin for all four pairs
  - .10 Average PS AACR-F, worst case margin

**END OF SECTION 27 08 11.03** 

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#### 27 11 00 COMMUNICATIONS ROOM FITTINGS

#### PART 1 GENERAL

#### 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 Communications Rooms Overview
- .4 Communications Room Design

#### 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 13 13 Copper Backbone Systems
  - .3 Section 27 13 23 Fiber Backbone Systems
  - .4 Section 27 15 00 Horizontal Cabling
  - .5 Section 27 16 00 Connecting Cords, Devices and Adaptors
  - .6 Section 27 21 33 Data Communications Wireless Access Points

#### 1.3 COMMMUNICATIONS ROOMS OVERVIEW

- .1 EF (Entrance Facilities) The EF is an environmentally controlled space consisting of the pathways(s), space(s), cables, connecting hardware, protection devices and other passive and active equipment that support the access and service provider. For Acute Hospitals, multiple entrance points and route diversity shall be provided. Entrance points shall be established distant from each other with a minimum separation of 20m, entering the building from two or more different streets. The functions of the EF are:
  - .1 Demarcation point between the access and service provider cabling and equipment and the hospital's network infrastructure.
  - .2 Electrical protection for inter-building campus backbone and access and service provider cabling. Electrical protection is governed by local electrical codes.
  - .3 Connection point between outside plant cabling and building cabling that is accomplished by splicing or other means.
  - .4 House electronic equipment owned by the carriers that is required to provide their network services (In-building Cellular Node B equipment, Wide Area Network (WAN) Data, PSTN Connectivity, CATV/IPTV) to the building.
- MER (Main Equipment Room) The MER is to be considered distinct from Telecommunication Rooms (TR) and Telecommunications Enclosures (TE) because of the complexity of the equipment they contain. An MER may alternatively provide any or all of the functions of a TR or TE. The main cross-connect (MC) of a healthcare facility is located in the MER. Intermediate cross-connects (IC), horizontal cross-connects (HC), or both, of a healthcare facility may also be located in the MER. For Acute Hospitals, a minimum of two diverse pathways shall be provided between the MER and the EF. The MER is an environmentally controlled space whose functions are to:
  - .1 House core telecommunications equipment (determined at the discretion of PHSA NE based on specific site requirements), connecting hardware, cables, pathways, splice closures, grounding and bonding facilities and appropriate protection

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- apparatus. The MER may also house horizontal terminations for a portion of the facility.
- .2 Contain either the MC or the IC used in the backbone cabling hierarchy.
- .3 Provide for the administration and routing of the equipment cabling, and or cords, from the MC or IC to the telecommunications equipment.
- TR (local Telecommunications Room) The TR is an environmentally controlled space that provides a common access point for pathways, backbone cabling and horizontal cabling. The TR may also contain cabling used for cross-connection. The horizontal cross-connect (HC) is located in the TR. The intermediate cross-connects (IC) may also be located in a TR. The functions of a TR are to:
  - .1 House horizontal and backbone cables to connecting hardware.
  - .2 House telecommunication equipment, connecting hardware and splice closures serving a portion of the building. The TR shall not house PABX, Servers, Core Equipment, Network Storage equipment, etc.
  - .3 Provide for the administration and routing of equipment cords from the HC to the telecommunications equipment.
- .4 HE (Antenna Headend Equipment Room) The HE shall be located on the roof and as close to the antennas as possible. The room shall accommodate all provided and planned radio frequency based (RF) Special Systems and Headend Equipment Cabinets required for site wide wireless systems (such as clock GPS, Facilities and Security 2-way radio systems, SAT Com, ECOMM 911) intra-site wireless communications systems and carrier macro cellular antenna systems.
- .5 The quality of the Communications room details shall match or exceed the PHSA Communications standard drawings in details.

#### 1.4 COMMUNICATIONS ROOM DESIGN

- .1 Communications rooms shall be designed and located with expansion and maintenance as the foremost thought taking into consideration factors such as building size, post-disaster survivability, the variety of IT and low voltage systems that are required in a modern healthcare facility, working space (1m clearances shall apply around the front, rear and at least one side of an equipment rack line-up) and horizontal cable density and length. Healthcare facilities have many types of electronic systems sharing same pathways and spaces. A sampling of these systems include Voice, Data, Overhead Paging, CATV/IPTV, Security Systems (Access Control, Intrusion Detection, CCTV, Panic Duress), Audio/Visual (Video Conferencing), Distributed Antenna System (DAS), Public Address, Clock System, BMS, Nurse Call, Intercom Systems, RFID Based Systems and Biomedical Systems (Physiological Monitoring, Telemetry) and Interactive Patient Infotainment System. Each of these and related systems shall have specific space requirements for maintainability that must be considered when designing all communications rooms.
- .2 General Requirements and Restrictions
  - .1 Communications rooms shall only contain low voltage wiring, terminations and distribution equipment. Fire alarm, BMS and Lighting Control wiring and panels that are 50V and under are permitted in any type of Communications room. Network switches required to provide IP connectivity to BAS, Access Control, Fire Alarm, Nurse Call, Patient Entertainment and Lighting Control Systems are permitted within Communications rooms.
  - .2 Any equipment, material, or service located in Communications Rooms which requires access by the Building Occupant shall be restricted to authorized Building Personnel. Non-authorized Maintenance Personnel, or outside Agencies are prohibited.

.3

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- .3 HVAC, electrical, plumbing, heating, sprinkler, medical gases, fluids, pneumatic tubes and any other non-telecommunications building service shall not be routed through Communications Rooms.
- .4 Communications Rooms or adjoining walls shall not have drain pipes, sprinkler risers and plumbing pipes located within them. shallCommunications rooms shall be vertically stacked on all floors throughout the height of the building. If an additional TR is required on any floor, spatially separate the rooms on the plan and position these in different architectural fire-compartments.
- .5 Triangle, L-shaped, curved or any other odd shaped room is not acceptable for use as a Communications Room.
- .6 If the space required to support all the electronic or low voltage systems required in the facility exceeds the minimum sizes and or growth factor requirements specified herein, Communications Rooms shall be increased in size to provide adequate space for these systems.
- .7 Room sizing shall take into consideration the wall mounting area required for each system.
- .8 Communications rooms shall not be located in areas that are restricted by building components (stairwells, exterior walls, sheer structural walls, elevator shafts) that limit expansion.
- .9 Communications rooms shall be located away from services or conditions that will endanger or adversely affect active equipment and cabling.
- .10 Communications rooms cannot be situated in areas where there are occupancy constraints or limitations or conditions that would not comply with WorkSafe BC and internal Occupational Health and Safety regulations.
- .11 The height required within the Communications rooms shall be no less than 3048 mm.
- .12 Communications rooms must always be accessible from an elevator and the access path from the elevator to the Communications room must be:
  - .1 Well lit
  - .2 Have sufficient height and width to move equipment racks and enclosures
  - .3 Designed to enable the use of mechanical handling aids such as pallet jacks, hand trucks and carts easily
  - .4 Unimpeded by permanent obstacles such as mechanical ducts and pipes
- .13 In Communications rooms where conduits are exposed, locate them at the corner or at the bottom of the walls so as not to interfere with the installation of current or future wall-mount panels or hardware.
- .14 All aspects of the installation of Communications Rooms shall be reviewed and approved by the Communications Consultant and or the PHSA NE Representative. Acute Hospitals
- .1 The Communications Consultant in consultation with the PHSA NE Representative shall provide a communications room design based on ANSI/TIA 1179-A Healthcare Facility telecommunications cabling standard and best practices, and ANSI/BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities.
- .2 Entrance Facilities (EF):
  - .1 The minimum design and installation standard for an EF is ANSI/TIA-569-D.
  - .2 If the EF is to support additional access and service provider systems such as Carrier Node B cellular equipment to provide input into an in-building DAS system or CATV, the EF shall be increased in size to provide adequate space for these systems.
  - .3 When multiple EF's are used, they shall have a minimum separation of 20 m to maintain diversity.
  - .4 Must be located above the 200-year flood plain.

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- .3 Main Equipment Room (MER):
  - .1 Minimum sizing specification for an MER is 3.66m x 7.62m. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations.
  - A growth factor of 100% shall be considered when determining room size. This growth can be accommodated by dedicating space adjacent to the MER that can be claimed in the future if so required (e.g. storage room).
  - .3 Must be located above the 200-year flood plain.
- .4 Telecommunications Rooms (TRs):
  - .1 Determined by the size of the building, 80 meter coverage area (based on a maximum permissible permanent link length of 80m), and density of drops in application specific work areas and spaces. Example: The location of the TR is based on the 80m maximum length of cable required to reach the extremities of a building's interior space, for current and future outlets.
  - .2 The TR shall be located on the same floor as the work areas served.
  - .3 A growth factor of 50% shall be included when determining the room size.
  - .4 The minimum sizing specifications for a TR is 3.66m x 4.88m. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations.
- .5 Antenna Headend Equipment Room (HE)
  - .1 The minimum size of the HE is 3639mm wide x 7620mm in length and it will house six of the wider 584mm carrier equipment racks containing active and passive equipment and power components for various wireless systems.
  - .2 The HE shall be connected to the building backbone riser and be furnished with the same supporting infrastructure as any other Communications room.
- .4 Community Sites
  - The Communications Consultant in consultation with the PHSA NE Representative shall provide a communications room design based on ANSI/TIA 569-D Commercial Building Telecommunications Cabling Standard,
  - .2 Entrance Facilities (EF):
    - .1 If the EF is to support additional access and service provider systems such as Carrier Node B cellular equipment to provide input into an in-building DAS system or CATV, the EF shall be increased in size to provide adequate space for these systems.
  - .3 Main Equipment Room (MER):
    - Minimum sizing specification for an MER is 3.66m x 4.88m. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations.
  - .4 Telecommunications Rooms (TRs):
    - Determined by the size of the building, 80 meter coverage area (based on a maximum permissible permanent link length of 80m), and density of drops in application specific work areas and spaces. Example: The location of the TR is based on the 80m maximum length of cable required to reach the extremities of a building's interior space, for current and future outlets.
    - .2 The TR shall be located on the same floor as the work areas served.
    - .3 A growth factor of 50% shall be included when determining the room size. Maximum number of horizontal cables per rack/cabinet shall be 240 at the time when a new facility becomes operational.
    - .4 The minimum sizing specifications for a TR is 3.66m x 3.05m. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations.
- .5 For standalone buildings dedicated to office use situated outside an Acute Hospital campus, the following definitions are provided to help clarify the planning requirements for each space:
  - .1 Buildings larger than 100 m<sup>2</sup> and smaller than 500m<sup>2</sup> may be served by a large Communications closet. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations applicable to the design of the large Communications closet. The

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- Communications closet shall have the following <u>clear</u> dimensions: 3658 mm x 1220 mm with a minimum height of 3048 mm.
- .2 Buildings less than 100 m², a small Communications closet may be considered. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations applicable to the design of the small Communications closet. The Communications closet shall have the following clear dimensions: 2150 mm x 1220 mm with a minimum height of 3048 mm.
- .3 Where the data and voice equipment or the service providers' demarcation points are installed in the Communications closet, a detailed design must be completed of the closet to determine the space requirements and the layout of the closet. The detailed design shall follow the same intent as the PHSA standardized designs and must be submitted for PHSA NE Representative for approval.

#### PART 2 PRODUCTS

#### 2.1 EQUIPMENT RACKS / CABINETS

- .1 Four Post Equipment Rack
  - Free standing 4-post rack, 2133.6 mm high x 610 mm wide x 914.4 mm deep, gang-able, c/w RU markings (RU1 at top & RU44 at bottom) on front and rear posts and rails.
  - .2 Top adjustable channels with mounting hardware.
  - .3 When assembled as a single unit, the 4-post rack must conform to seismic Zone 4 NEBS Telcordia GR-63-CORE Earthquake requirements
  - .4 Must provide 482.6 mm (19") rack mount capability for rack mountable components.
  - .5 Must provide 1955.8 mm of vertical mounting space. (44U)
  - .6 Must have 10-32 tapped mounting holes on uprights, front and rear.
  - .7 Shall be black medium texture durable powder coat finish.
  - .8 Must provide ground stud at the top and bottom of the frame.
  - .9 Include equipment mounting hardware.
  - .10 Provide solid bottom shelf when required.
  - .11 Accepted Manufacturer: Belden and Hammond

#### .2 MER Server Cabinet

- Cabinets shall be open type, (2133.6 mm high x 915 mm wide x 1066 mm deep c/w integrated wire managers front and rear, and be made of 14 gauge cold-rolled steel welded construction. Frame shall include ganging hardware, and grounding studs in front and rear of the frame base. Frame shall have (4) four 4-inch KO brush openings (one directly over each vertical manager section for horizontal cabling) in top for cable entry when required.
- .2 Server cabinets c/w RU markings (RU1 at top & RU45 at bottom) on front and rear posts and rails.
- .3 Seismic Zone 4 NEBS Telcordia GR-63-CORE certified
- .4 Cabinets with 4 sets of 11 gauge 482.6 mm (19") EIA mounting rails, 2 sets are adjustable. Includes 50 count mounting hardware.
- .5 Loaded with 10-32 cage nuts.
- .6 Black medium texture durable powder coat finish.
- .7 Top Panel removable: Solid when required.
- .8 Front Door: Perforated with Locking Swing Handle when required.
- .9 Rear Door: Perforated with Locking Swing Handle when required.
- .10 Two Half Height (Top and Bottom), Bolted on, Easy Lift Off, Flush Mount, Locking Side Panels on Both Sides when required.

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- 1.10.1 Side panels will have (1) four 4-inch KO opening (in line with top horizontal manager in front of rack/cabinet for patch cord cabling).
- .11 Bottom Panel: Solid with Rear Brushed Opening when required.
- .12 Finger strips on all rails front and rear.
- .13 (2) 7.0" lacing panels mounted in the rear.
- .14 Accepted Manufacturer: Belden or equal.
- .3 Wall Mount Totally Enclosed Cabinet
  - .1 Cabinets shall be enclosed type; (1130 mm high x 762 mm deep x 762 mm wide c/w integrated vertical wire managers: 75mm wide on both sides of front (finger style) and lacing bars on both sides of the rear.
  - .2 Removable side panels with c/w two (2) 310mm square ventilated knockouts. If required the knockouts can be removed in lieu of 310mm square filter kits.
  - .3 The bottom panel is solid.
  - .4 The top panel is vented with (4) 102 mm fan mounting provisions and (2) 75 mm
  - .5 Wall cabinets c/w RU markings (RU1 at top & RU22 at bottom) on front and rear posts and rails.
  - .6 Four (4) 102 mm cabinet fans and thermostat kit
  - .7 Cabinets with 3 sets of adjustable mounting rails. (c/w RU markings)
  - .8 Loaded with 10-32 cage nuts.
  - .9 Accepted Manufacturer: Belden and Hammond
  - .10 Filter kits for the side panels

## 2.2 CABLE MANAGEMENT SYSTEMS (CMS)

- .1 Vertical Cable Management System
  - .1 Double sided
  - .2 Front Channel
    - .1 152mm-305mm wide x 254mm deep (refer to detail drawing).
  - .3 Rear Channel
    - .1 152mm-305mm wide x 254mm deep (refer to detail drawing).
    - .2 305mm wide between racks; 152mm wide at end unit.
  - .4 Acceptable Manufacturers: Belden, Commscope and Hammond.
  - .5 Vertical cable management shall be from the same Manufacturer as the racks / cabinets. When the rack and vertical manager are not made by the same manufacturer, the acceptable manufacturers for the vertical manager are Commscope, Hammond and Belden.
  - .6 Must be equipped with removable doors and straps, removable side fingers,
  - .7 access cut-outs at the back, and 2 sets of removable spools per front channel to take up patch cable slacks.
  - .8 The back of the cable trough must have stances to provide fastening for
  - .9 Horizontal cabling to the back of the trough.
  - .10 CMS must be gang-able.
  - .11 Shall be black in colour.
- .2 Horizontal Cable Management.
  - .1 Horizontal cable manager at the top of each rack shall be a newest released 2U finger-type horizontal manager compatible with the finger-type vertical manager (Refer to C-STD drawings in 27 00 00.01).
  - .2 Acceptable Manufacturers: Belden and Commscope.

### 2.3 UTP PATCH PANELS

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- .1 Patch panels for UTP horizontal cabling shall be a newest released flat 1U modular 24-port unit or 2U modular 48-port unit, suitable for mounting on 482.6mm (19") racks. Refer to rack elevation drawings.
- .2 Patch panels for UTP 25-pair voice tie cabling shall be a newest released flat 1U modular 24-port unit, Category 6, suitable for mounting on 482.6mm (19") racks.
- .3 IDC RJ45 discreet modular jacks shall be used on the patch panel.
- .4 Acceptable Manufacturers: Belden or Commscope.
- .5 For all existing Acute sites, migrating from an existing Cat.6 or Cat.5e cabling system to Cat.6A system provide the followings:
  - .1 A 1U 24 port Cat.6A patch panel (fully loaded) on the upper most suitable position on a rack (P1).
  - .2 A 1U 48 port Cat.6A patch panel (fully loaded) for all other panels (P2, P3, etc.) located below P1 on a rack.
- .6 Provide a manufacturer's patch cord extraction tool for each rack c/w a seven foot tether (rope or chain) attached to the top of the rack.

#### 2.4 OPTICAL FIBER PATCH PANELS

.1 Refer to Section 27 13 23 for components and details.

#### 2.5 IDC TERMINATION BLOCKS

- .1 Shall be Belden, GigaBIX Mount, GigaBIX Connector, 25-pair, to terminate voice multi pair (25 pair) backbone cables.
- .2 Belden GigaBIXWire Guard.
- .3 Belden GigaBIX Designation Strip,
- .4 Belden GigaBIX Management Ring
- .5 Belden GigaBIX cable management module (installed behind GigaBIX mount to facilitate cable routing).
- .6 Belden GigaBIX horizontal channel plate.

# 2.6 UNINTERRUPTABLE POWER SUPPLY (REFER TO APPENDIX B & C ON UPS)

- .1 General Guidelines for Centralized IMIT Network Dedicated 3 Phase UPS.
  - .1 The following are the key requirements for a Centralized Network Dedicated UPS system:
    - .1 Powerware Model: Power Xpert 9395 Series in an N+1 configuration
    - .2 High Efficiency Mode
    - .3 ESS: Energy Saver System
    - .4 boosts efficiency to 99% across all load ranges
    - .5 less than 2ms transition time
    - .6 inherent surge protection, non-degenerative filtering for lighting strikes
    - .7 load fault detection and clearing, with a fault at source or load
  - .2 Multi Module Management:
    - .1 VMMS: Variable Module Management System
    - .2 Automatically scale the UPS to match demand, loading required modules to gain efficiency
    - .3 Automatically rotates through the power modules to increase MTBF by spreading load evenly across the system
  - .3 Centralized UPS shall be configured in an N+1 configuration.
  - .4 UPS Lithium Batteries to be Flame Retardant and carry a full 5-year replacement warranty directly with UPS manufacturer.

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- .5 Inherent battery system that eliminates float charging and predicts pending battery failure.
- .6 UPS to be supported directly by manufacturer, with 4 (or at least 3) UPS dedicated service technicians resident in BC.
- .2 General Guidelines for rack mount for existing acute sites and community sites.
  - .1 The local UPS for this configuration shall be:
    - .1 Powerware 9PX models. Refer to Appendix C for guidelines.
    - .2 Four post rack mount kit
    - .3 Temperature Probe
    - .4 Network Management Card

# 2.7 METERED POWER BARS (EPDU)

- .1 Refer to Appendix C for approved vertical and horizontal metered power bars (ePDUs).
- .2 Provision for additional power bar to the work scope on an as needed basis to power clinical and vendor equipment.

# PART 3 EXECUTION

#### 3.1 COMMUNICATIONS ROOM FINISHES

- .1 All types of Communication Rooms require a minimum one-hour fire rating.
- .2 Penetrations through walls, floors and ceilings shall be fire-stopped using products based on the requirements of Fire Stop Systems 27 05 29 and in accordance with Section 27 05 28 Pathways for Communications Systems.
- All walls shall be to underside of slab. All walls shall be lined with rigidly installed 20 mm (3/4"), AAA G1S plywood painted with two coats of light coloured fire resistant paint applied to all sides. Sanding between coats is mandatory. The plywood panels shall extend from floor level to a height of 2438mm. Treated fire-retardant plywood shall have two coats of light coloured paint applied on the surface. In this instance, expose the certified stamped mark.
- .4 There shall be no suspended ceiling installed in a Communications Room
- .5 All communications rooms shall have a minimum of two horizontal pathway entry points for access from adjoining ceiling spaces using 103 mm Hilti Speed sleeves. They shall be located on separate walls of the communications room. Refer to pathways section 27 05 28 for coordination with cable tray installation in the hallways.
- .6 Unless specified to the contrary, a minimum of one equipment rack shall be supplied and installed in each Communications room.
- .7 The use of a pull pit in Communications Rooms shall not be acceptable.

# 3.2 DOORS

- .1 All doors shall be commercial grade and fitted with a auto closer and card access system.
- .2 Where the Communications Room is directly accessible from the building's exterior or from parkade areas, door hinges are to be recessed or hiddent with a full length astragal installed.
- .3 Lockset to be store room function.

The door shall swing 180° out to gain valuable floor and wall spaces inside the room for equipment and cable installs, and to provide working space for pulling entrance and riser

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cables. If the door must swing into the room, then the room shall be increased in size by the width of the door to compensate for lost space.

- .4 Communications rooms shall be accessible from corridor with minimum door opening of 1066mm wide and 2133mm high.
- .5 Provide a door sweep.

#### 3.3 SECURITY

- .1 Access Control:
  - .1 The Contractor shall coordinate and arrange for installation of Communications Room's card access system prior to the installation of network equipment, with Communications Consultant and Integrated Protection Services.
  - .2 Only the main entry door shall be equipped with a network access control card reader. Supplementary doors shall be for exit only.
  - .3 Manual punch code locks are not permited on any Communications Room doors.
- .2 Keys:
  - .1 Key shall be cut to fit all the Communications Rooms within the same building.
  - .2 A copy of the key shall be given to Facilities Maintenance and Operations (FMO).
  - .3 If the Communications Room is equipped with a supplementary door, no keys shall be issued for these doors in order to ensure the audit trail through the access control system remains intact. Keys issued for the main entry doors that bypass the card reader should be limited for emergency access only.
- .3 Intrusion Alarm:
  - An intrusion alarm shall be provided when the Communications Room is directly accessible from the building's exterior or from parkade areas.
  - .2 Alarm shall consist of door contacts on all doors, dual tech motion detector(s) and keypad.
  - .3 Control panel is to be located within a secure space.
  - .4 Intrusion system is not to be integrated with access control to arm or disarm the alarm.
- .4 All Communications Rooms shall be equipped with CCTV camera(s). CCTV camera(s) shall be used to identify people entering the room, and the CCTV coverage shall be such that there are no blind spots. CCTV camera footage to be recorded on base building security systems and stored for a minimum of 30 days.

#### 3.4 FINISHES

.1 Wall and floor finishes shall be light in colour to enhance the brightness of the room.

#### 3.5 FLOORING

- .1 New Communications Room floor coverings shall be anti-static linoleum composite sheeting (i.e. "Marmolium") or as noted on drawings. Vinyl tiles or sheeting are not acceptable.
- .2 There are Conductive or Static Dissipative linoleum flooring products on the market and if this is selected then the installer must ground the floor to the Telecommunications Bus Bar.

# 3.6 FLOOR LOADING

.1 Floor loading (static and dynamic) capacity in the space shall be sufficient to bear both the distributed and concentrated load of the installed equipment. A structural engineer shall be consulted during the design to specify the floor loading limit. If equipment that

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exceeds these limits is anticipated, the areas of the floors where the equipment shall be moved and installed shall be appropriately reinforced.

.2 The minimum floor load capacity shall be 50 lbs/square foot in TRs and 150 lbs/square foot in EF and main ER Rooms.

### 3.7 SIGNAGE

.1 For communications room signage, refer to Section 27 05 53.

# 3.8 SMOKE DETECTOR, HEAT DETECTOR, SPRINKLER SYSTEM

- .1 Communications rooms shall be separated from the remainder of the building by rated fire barriers and equipped with smoke and heat detection as well as dry pre-action sprinkler system. Wet sprinkler systems are not permitted. A dry pre-action sprinkler system will also be required in the UPS Room.
- .2 For existing "wet" sprinkler systems in Communication spaces, replace existing sprinkler head with high temperature type and provide drip tray under sprinkler head if sprinkler head is over equipment racks and cabinets.
- .3 Provide cage to sprinkler heads for mechanical protection in all cases.

#### 3.9 LIGHTING

- .1 The lighting in Communications rooms shall be coordinated with the equipment layout, particularly overhead cable trays, equipment racks and server cabinets, to ensure the light is not obstructed.
- .2 The lighting provided in each Communications room shall meet the following requirements:
  - .1 Lighting fixtures will be mounted at a minimum of 2.8m AFF unless otherwise approved by the Authority through the review procedure.
  - .2 Lighting fixtures and associated power cables will have a minimum separation of 50 mm from Communications cabling.
  - .3 The minimum light levels will be 500 lux in the horizontal plane and 200 lux in the vertical plane @ 1 m above the finished floor. When performing lighting calculations, take into account the light loss due to a full cable tray.
  - .4 Interior room lighting will be supplied from both the vital and conditional power branches of the building emergency generator system with a minimum of 50% of the lights supplied from the vital branch; or from battery packs where the generator system is not available.
  - .5 Lighting will not be powered from the same panel as the telecommunications and Π equipment in the space.
  - .6 Provide local light switching and an occupancy sensor(s) to control the lights.

### 3.10 HVAC

- .1 The HVAC requirements for Communications Rooms are as follows:
  - HVAC systems serving Communications Rooms will maintain a temperature between 18-24 degree Celsius (dry bulb temperature) with a relative humidity between 25% and 60%. Anything outside these ranges will generate an alarm that will be visible on the Facility's building management system.
  - .2 HVAC systems for Communications Rooms shall be scalable, reliable and operate without interruption (24/7, 365 days per year) while being efficient to operate, both in terms of energy consumption and from a maintenance perspective.
  - .3 The HVAC system shall be powered from the Emergency Generator Power system.

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- .4 The MER shall be equipped with a minimum of two dedicated HVAC units to share the total forecasted cooling load.
- .5 Supply and install separate, in room controls for the HVAC systems serving all Communications Rooms in order to enable the correct amount of cooling capacity and humidity control to be delivered to each Communications Room.
- The air pressure inside the room shall be positive to force the air out of the room to mitigate dust accumulation. Provide a minimum of 1 complete air change per hour.
- .7 For Existing Acute Care site, the forecasted maximum cooling load of the room shall be determined by the Communications Consultant in consultation with the PHSA NE Representative during the design stage of the project. This information shall be provided to the Mechanical Engineer to design the appropriate cooling solution to meet the forecasted heat load for the room. Mechanical equipment such as fan coils and associated supply and return air ducting that are providing dedicated cooling to communications rooms are to be located outside of the communications rooms unless otherwise approved by the Communications Consultant and or the PHSA NE Representative).
- .8 For new Acute Care sites, the mechanical designer will design a dedicated scalable, reliable and N+1 redundant cooling capacity in a consistent manner in all the Communications Rooms to permit all equipment racks to be fully populated.
  - A minimum of 6000 BTUs of cooling capacity will be provided per equipment rack and server cabinet in all Communications Rooms in the Facility. This includes the provision of 6000 BTUs of cooling capacity for future equipment racks and server cabinets that can be accommodated within the Communications Rooms.
- .9 Each Communications Room will be provided with supply and return air through dedicated ducts that serve only the room in order to ensure that the environment inside each Communications Room is not influenced by external factors.
- .10 For Acute Care facilities, the supply and return air distribution system for providing cooling to the racks and cabinets will be built in a Hot Aisle Cold Aisle orientation in all Communications rooms without the air ducts entering the rooms. Provide a design that maximizes the cooling efficiency for the rooms.

### 3.11 EQUIPMENT RACKS / CABINETS (REFER TO DRAWINGS FOR SIZING)

- .1 Each rack / cabinet shall be plumbed and levelled, and solidly bolted to the floor with bolts, washers and brackets. Bonding of rack to ground per TIA -J-STD-607B and Section 27 05 26.
- .2 Equipment racks / cabinets shall be seismically restrained and approved per Seismic Engineer of record.
- .3 Where two or more racks are mounted side by side, the racks shall have a double sided 12 wide vertical manager installed in between and ganged with metal bolts and washers.
- .4 Provide access clearance of 1m in the front, the side and the rear of the racks. Where several rows of racks are located side by side, the row spacing shall be a minimum of 1 m. A minimum clearance of 50 mm shall be maintained between one side of the rack vertical manager and the wall. All clearances are to be measured from the face of any equipment mounted to the wall and from the front of vertical cable managers.
- .5 Typical rack / cabinet data port capacity shall be 240 horizontal cables at the time when the facility becomes operational.
- .6 The number of Racks in a communication room is based on the horizontal cable count of the floor area being served and the spare space requirements in each room. This along with the 3<sup>rd</sup> party rack requirements as identified in the Communications Standard Drawings determines the rack count in each communication room.

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- .7 Wall-mount open Rack and wall-mount enclosed Cabinet may be considered when the building is less than 100 m² and there is no wall space requirement for any low voltage systems. Refer to Appendices E.1 and E.5 for product manufacturers, dimensions and specifications.
  - .1 The applicability of wall-mount open Rack is when it is located in secured or protected Communications spaces e.g. existing Communications room that has limited space for growth.
  - .2 The applicability of wall-mount enclosed lockable Cabinet is when it is located outside the security of Communications spaces e.g. mechanical room, electrical room, and unsecured spaces accessible to the general public but located in the area of staff presence.

## 3.12 BACK-UP POWER AND POWER OUTLETS

- .1 Where rack mount UPS units are used in Acute care sites the power outlets servicing Communications racks are on Vital/Generator Power Panels and Utility Power Panels;
- .2 Where Centralized UPS equipment is used in Acute care sites, the power outlets servicing Communications racks are on UPS Power Panels and Vital Power Panels;
- .3 Where rack mount UPS units are used in Community sites the power outlets servicing Communications racks are on Utility Power Panels;
- .4 Electrical Engineer shall coordinate with Communications Consultant and or the PHSA NE Representative to design power and UPS requirements for all network and low voltage equipment in every type of communication space.
- Typical requirements for ePDU power feeds to Racks and or Cabinets in Acute Care Sites each Rack/Cabinet will have two (2) ePDU's from the following power supplies (Refer to C-STD drawings and Appendix B):
  - .1 Best Option
    - .1 one Power Distribution Unit is powered from a Centralized UPS source on UPS Electrical Panel:
    - .2 the second Power Distribution Unit is fed from a Vital/Generator Power Panel
  - .2 Option 2
    - .1 one ePDU is powered from a rack mount UPS source. (Rack mount UPS feed from Vital/Generator Power Panel)
- .2 the second Power Distribution Unit is fed from a second Utility Power Panel
  .6 The Contractor shall provide a minimum of (2) dedicated 20A, 120V AC on
  Vital/Generator power circuits. These circuits are to appear in double gang duplex (520RA) convenience outlets located at not more than 6ft intervals around perimeter walls
  of EF, MER and each TR. Convenience outlets shall be set flush-mounted and centred at
  305 mm AFF (or match mounting height of existing receptacles) and be identified and
  marked (Refer to C-STD drawings in 27 00 00.01). They shall not appear under GigaBIX
  wall.
- .7 In Community sites, use Emergency Generator power whenever available. Otherwise utility power is an acceptable alternative for convenience and equipment rack receptacles.
- Minimum IMIT UPS runtime where the input power source is from a Vital/Generator Power is ten minutes. Minimum runtime for Network UPS is increased to 30 minutes when Utility power is used as the sole input power source. If the required runtimes cannot be maintained by the UPS internal batteries, engage the Communications Consultant and or the PHSA NE Representative regarding the installation of additional battery modules.
- .9 Power distribution to and inside an Entrance Facility (EF) room shall vary from site to site based on the specific needs of the facility. Establishing specific requirements above each

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equipment rack shall need to be coordinated with service providers and the Communications Consultant and or the PHSA NE Representative.

.10 For a summary of Rack and/or Cabinet Power Requirements and a list of acceptable products refer to:

Appendix B – PHSA Communications Standard – Power Distribution for all Communications Spaces

Appendix C – PHSA Communications Standard – UPS & Power Distribution Unit

# .11 Rack Mount UPS Power

- 1 The installation of rack mount UPS units is acceptable in the following scenarios:
  - .1 Existing communication rooms in existing Acute and Community sites.
  - .2 New communication rooms in existing Acute and Community sites.
  - .3 New communication rooms in new Community sites.
  - .4 Remote Sites
- .2 Within existing sites, the application of the specifications and guidelines detailed within this section are subject to specific site conditions. If existing site conditions prevent the design and implementation of the specifications and guidelines as detailed within this section, the Electrical Engineer must work with the Communications Consultant and or the PHSA NE Representative to find a suitable solution.
- .3 If a rack mount UPS system is being provisioned for an MER room; the Communications Consultant and or the PHSA NE Representative shall be consulted for specific UPS requirements.
- .4 Specifications and Guidelines are based on Eaton Powerware 9PX UPS products.
- .5 All UPS systems and Power Distribution Units are to be physically connected by the Division 27 Contractor to a network switch port designated by a PHSA NE Representative.
- .6 Telecommunication Room consisting of a single rack serving a wiring space with 0-240 horizontal drops:
  - .1 Provide two (2) L6-30R receptacles each on dedicated circuits above the rack one on Vital/Generator Power and one on Utility Power. One L6-30R (Vital/Generator) shall be used to provide input power into the UPS and the other shall be used for a metered Power Distribution Unit.
  - .2 Provide a rack mount 6000VA UPS c/w
    - .1 L6-30P input cord (Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings in 27 00 00.01 for receptacle locations)
    - .2 2 x L6-30R output receptacles
    - .3 Four post rack mount kit
    - .4 Temperature Probe
    - .5 Network Management Card

      \* If 1500VA UPS system is required to distribute 120V UPS Protected
      Power to the equipment rack refer to Appendix C for appropriate
      model number.
  - .3 Provide one basic and one monitored/metered Power Distribution Unit c/w L6-30P input cords (3.05m /10 feet)
    - .1 Zero U Power Distribution Unit
    - .2 ePDU #1 plugs (basic) directly into the 6000VA UPS unit

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- .3 ePDU #2 plugs (metered) into the L6-30R receptacle located above the Rack
- .4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

# .7 For an Acute Care Telecommunication Room consisting of two racks serving a wiring space with 0-240 horizontal drops:

- .1 Rack 1 Provide one (1) L6-30R receptacle, on dedicated circuits above the rack on Utility Power. The Utility Power will be used for a metered Power Distribution Unit.
- .2 Rack 2 Provide two (2) L6-30R receptacles, each on dedicated circuits above the rack 2, one (1) on Vital/Generator and one (1) on Utility Power. The Vital/Generator Power will be used to provide input power into the UPS and the other will be used for a metered Power Distribution Unit.
- .3 Provide a rack mount 6000VA UPS in Rack 2 c/w
  - L6-30P input cord (Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings in 27 00 00.01 for receptacle locations)
  - .2 3 x L6-30R output receptacles
  - .3 Four post rack mount kit
  - .4 Temperature Probe
  - Network Management Card
     \* If 1500VA UPS system is required to distribute 120V UPS Protected
     Power to the equipment rack, refer to Appendix C for appropriate model number.
- .4 Rack 1 Provide one basic and one monitored/metered Power Distribution Unit c/w L6-30P input cords (3.05m/10 feet)
  - .1 Two (2) Zero U ePDUs
  - .2 Power Distribution Unit #1 (basic) plugs directly into the 6000VA UPS
  - .3 Power Distribution Unit #2 plugs (metered) into the L6-30R receptacle located above the Rack
  - .4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.
- .5 Rack 2 Provide one basic and one monitored/metered ePDUs, c/w L6-30P input cords (3.05m/10 feet)
  - .1 Zero U ePDUs
  - .2 ePDU #1 (basic) plugs directly into the 6000VA UPS unit
  - .3 ePDU #2 (metered) plugs into the L6-30R receptacle located above the Rack
  - .4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

# .8 For Acute Care Telecommunication Room consisting of three racks serving a wiring space with 0-480 horizontal drops:

- .1 Rack 1, 2 & 3 Provide one (1) L6-30R receptacle per Rack 1, 2, & 3; on Utility Power. Utility Power will be used for a metered Power Distribution Unit.
- .2 Provide a rack mount 8KVA UPS in Rack 2 c/w
  - .1 Direct feed or hardwired connection to the UPS from Vital/Generator power
  - .2 Three (3) L6-30R output receptacles
  - .3 Four post rack mount kit

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- .4 Temperature Probe
- .5 Network Management Card
- Monitoring software and licensing
   \* If 3KVA UPS system(s) are required to distribute 120V UPS
   Protected Power to the equipment rack, refer to Appendix C for appropriate model number.
- .3 Rack 1, 2 & 3 Provide one monitored/metered Power Distribution Unit per rack, c/w L6-30P input cords (3.05m/10 feet)
  - .1 Zero U ePDUs
  - .2 ePDU (metered) plugs into the L6-30R receptacle located above the Rack
  - .3 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards
- .4 Rack 1, 2 & 3 Provide one basic Power Distribution Unit per rack, c/w L6-30P input cords (3.05m/10 feet)
  - .1 Zero U Power Distribution Unit
  - .2 ePDU (basic) plugs directly into the 8KVA UPS unit
  - .3 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards

# .9 For Acute Care Telecommunication Room consisting of four racks serving a wiring space with more than 480 horizontal drops:

- .1 Rack 1, 2, 3 & 4 Provide one (1) L6-30R receptacle per Rack 1, 2, 3 & 4; on Utility Power. The Utility Power will be used for a metered Power Distribution Unit.
- .2 Rack 1 Provide one (1) L6-30R receptacle on Vital/Generator Power. The L6-30R will provide input power to the 6000VA UPS.
- .3 Provide a rack mount 11KVA UPS in Rack 3 c/w
  - .1 Direct feed or hardwired connection to the UPS from Vital/Generator or Utility power.
  - .2 Three (3) L6-30R output receptacles
  - .3 Four post rack mount kit
  - .4 Temperature Probe
  - .5 Network Management Card
  - Monitoring software and licensing
     \* If 3KVA UPS system(s) are required to distribute 120V UPS
     Protected Power to the equipment rack, refer to Appendix C for appropriate model number.
- .4 Rack 1, 2, 3 & 4 Provide one metered Power Distribution Units per rack, c/w L6-30P input cords (10 feet)
- .5 Rack 1, 2, 3 & 4 Provide one basic Power Distribution Units per rack, c/w L6-30P input cords (10 feet):
  - .1 Zero U Power Distribution Unit.
  - .2 Power Distribution Unit #1 (basic) plugs directly into the Rack 1 to 6000VA UPS unit & Rack 2, 3 & 4 to the 11000VA UPS unit
  - .3 Power Distribution Unit #2 (metered) plugs into the L6-30R receptacle located above the Rack
  - .4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

# .10 For Acute Care Telecommunication Room consisting of seven racks serving a wiring space with more than 960 horizontal drops:

1 Rack 1, 2, 3, 4, 5, 6 & 7 - Provide one (1) L6-30R receptacle per Rack 1, 2, 3, 4. 5, 6 & 7; on Utility Power. The Utility Power will be used for a metered Power Distribution Unit.

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- .2 Rack 1 Provide one (1) L6-30R receptacle on Vital/Generator Power. The L6-30R will provide input power to the 6000VA UPS.
- .3 Provide a rack mount 11KVA UPS in Racks 3 and 6 c/w
  - .1 Direct feed or hardwired connection to the UPS from Vital/Generator or Utility power.
  - .2 Three (3) L6-30R output receptacles
  - .3 Four post rack mount kit
  - .4 Temperature Probe
  - .5 Network Management Card
  - .6 Monitoring software and licensing
- .4 Power Distribution Unit #1 (basic) plugs directly into the Rack 1 to 6000VA UPS unit & Rack 2, 3 & 4 to the 11000VA UPS unit
- .5 Power Distribution Unit #2 (metered) plugs into the L6-30R receptacle located above the Rack
- .6 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

# .11 For Community Sites Telecommunication Room consisting of a single rack serving a wiring space with 0-144 horizontal drops:

- .1 Provide two (2) L5-30R receptacles, each on dedicated circuits above the rack. One L5-30R is on Vital/Generator Power and the second L5-30R is on Utility Power. In sites that are not equipped with Vital/Generator power, Utility power is acceptable. One L5-30R The Vital/Generator Power will be used to provide input power into the UPS, and the other will be used for a metered Power Distribution Unit.
- .2 Provide a rack mount 3000VA UPS (refer to Appendix C for appropriate model number) c/w:
  - .1 2 x L5-30R output receptacles
  - .2 Four post rack mount kit
  - .3 Temperature Probe
  - .4 Network Management Card
- .3 Provide one basic and one monitored/metered Power Distribution Units (refer to Appendix C for appropriate model number), c/w L5-30P input cords (10 feet)
  - .1 Zero U Power Distribution Units
  - .2 Power Distribution Unit #1 (basic) plugs directly into the 3000VA UPS unit
  - .3 Power Distribution Unit #2 (metered) plugs into the L5-30R receptacle located above the Rack
  - .4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards

# .12 For Community Sites Telecommunication Room consisting of two racks serving a wiring space with 145-240 horizontal drops:

- .1 Rack 1 Provide one (1) L6-30R receptacle on Utility Power.
- .2 Rack 2 Provide two (2) L6-30R receptacles, each on dedicated circuits above the rack, one on Vital/Generator and one on Utility Power. Utility Power is acceptable where Vital/Generator is not available. The Vital/Generator Power will be used to provide input power into the UPS, and the other will be used for a metered Power Distribution Unit. Provide a rack mount 6000VA UPS (refer to Appendix C for appropriate model number) c/w.
  - .1 3 x L6-30R output receptacles
  - .2 Four post rack mount kit
  - .3 Temperature Probe

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- .4 Network Management Card
- .3 \* If 3000VA UPS system is required to distribute 120V UPS Power to third party equipment in the rack, refer to Appendix C for appropriate model number.
- .4 Provide one basic and one monitored/metered Power Distribution Units (refer to Appendix C for appropriate model number), c/w L6-30P input cords (10 feet)
  - .1 Zéro U Power Distribution Units
  - .2 Power Distribution Unit #1 (basic) plugs directly into the 6000VA UPS
  - .3 Power Distribution Unit #2 (metered) plugs into the L6-30R receptacle located above the Rack
  - .4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

# .13 For Community Sites Telecommunication Room consisting of three racks serving a wiring space with 241-480 horizontal drops:

- .1 Rack 1, 2, & 3 Provide one (1) L6-30R receptacle per Rack 1, 2, & 3; on Utility Power. The other Utility Power will be used for a metered Power Distribution Unit.
- .2 Provide a rack mount 8000VA UPS in Rack 2 (refer to Appendix C for appropriate model number) c/w
  - .1 Direct feed or hardwired connection to the UPS from Vital/Generator Power or Utility power when Vital/Generator Power is not available.
  - .2 Three (3) L6-30R output receptacles
  - .3 Four post rack mount kit
  - .4 Temperature Probe
  - .5 Network Management Card
- \* If 3000VA UPS system is required to distribute 120V UPS Power to third party equipment in the rack, refer to Appendix C for appropriate model number.
- .4 Provide one basic and one monitored/metered Power Distribution Units (refer to Appendix C for appropriate model number), c/w L6-30P input cords (10 feet)
  - .1 Zero U Power Distribution Units
  - .2 Power Distribution Unit #1 (basic) plugs directly into the 6000VA UPS unit
  - .3 Power Distribution Unit #2 (metered) plugs into the L6-30R receptacle located above the Rack
  - .4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

# .14 For Community Sites Telecommunication Room consisting of four racks serving a wiring space with 241-480 horizontal drops:

- .1 Rack 1, 2, & 3 Provide one (1) L6-30R receptacle per Rack 1, 2, & 3; on Utility Power. The other Utility Power will be used for a metered Power Distribution Unit.
- .2 Provide a rack mount 8000VA UPS in Rack 3 (refer to Appendix C for appropriate model number) c/w

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- .1 Direct feed or hardwired connection to the UPS from Vital/Generator Power or Utility power when Vital/Generator Power is not available.
- .2 Three (3) L6-30R output receptacles
- .3 Four post rack mount kit
- .4 Temperature Probe
- .5 Network Management Card
- .3 \* If 3000VA UPS system is required to distribute 120V UPS Power to third party equipment in the rack, refer to Appendix C for appropriate model number.
- .4 Rack 1, 2, 3 & 4 Provide one metered Power Distribution Units per rack, c/w L6-30P input cords (10 feet)one basic and one monitored/metered Power Distribution Units
- .5 Rack 2, 3 & 4 Provide one basic Power Distribution Units per rack, c/w L6-30P input cords (10 feet) (refer to Appendix C for appropriate model number), c/w L6-30P input cords (10 feet)
  - .1 Zero U Power Distribution Units
  - .2 Power Distribution Unit #1 (basic) plugs directly into the 8000VA UPS unit
  - .3 Power Distribution Unit #2 (metered) plugs into the L6-30R receptacle located above the Rack
  - .4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

# .15 Centralized Network Dedicated UPS Power

- .1 The installation of Centralized Network Dedicated UPS Power is acceptable in the following scenarios:
  - .1 Existing communication rooms in an existing Acute Hospital site (undergoing a wholesale power retrofit).
  - .2 New communication rooms in a new Acute Site.
- .2 Centralized Network Dedicated UPS & UPS Distribution shall support all the network and low voltage equipment located within Communication Room Spaces within a given building or buildings. In a campus environment, it is permissible to install multiple Centralized Network Dedicated UPS systems to feed individual or groups of buildings if it is not feasible to extend the UPS power distribution to all buildings from a single central location.
- .3 Centralized UPS shall be configured in an N+1 configuration
- .4 All Centralized Network Dedicated UPS systems shall be equipped with an external wrap around maintenance by-pass.
- .5 Centralized Network Dedicated UPS shall be located in their own dedicated room or within the facility's Main Electrical Room.
- .6 Zone 4 certified seismic installation is required on all installations of a Centralized Network Dedicated UPS System.
- .7 All Centralized Network Dedicated UPS systems must undergo a load bank test as part of the commissioning process.
- .8 Centralized Network Dedicated UPS and associated Power Distribution Units are to be physically connected by the Division 27 Contractor to a network switch port designated by a PHSA NE Representative.
- .9 The selection of the make and model of the Centralized Network Dedicated UPS system and its associated capacity, efficiency, features, configuration and extended (support and maintenance) warranties shall be done in consultation with the Communications Consultant and or the PHSA NE Representative. Remote management and monitoring capabilities are to be

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- determined in consultation with Facilities Maintenance and Operations as well as the Communications Consultant and or the PHSA NE Representative.
- .10 In new Acute Sites and in Existing Acute Sites where the power distribution systems are being retrofitted, all UPS and Vital power distribution panels servicing communication rooms must be dedicated and located inside the communication room. Refer to C-STD drawings in 27 00 00.01 for panel locations.
- .11 Standard Configuration for MER and TR Communications Rooms:
  - 1 Vendor or Third Party Equipment Rack Provide two (2) dedicated circuits L21-30R receptacles above the rack; one (1) L21-30R on Centralized Network Dedicated UPS power and one (1) L21-30R on Vital Power.
  - .2 Health Authority Equipment Racks Provide two (2) dedicated circuits L21-30R receptacles above the rack; one (1) L21-30R on Centralized Network Dedicated UPS power and one (1) L21-30R on Vital Power.
  - .3 Provide two monitored/metered Power Distribution Units, c/w L21-30P input cords (3.05m/10 feet) per rack. Equip one Power Distribution Unit in the centre of line-up with a temperature probe. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

**END OF SECTION 27 11 00** 

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#### 27 13 13 COMMUNICATIONS COPPER BACKBONE CABLING

Р	AR1	Г1	GENERAL

# 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 List of Terms as Used in this Specification
- .4 Communications Copper Backbone Cabling

# 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 08 11.02 Copper Testing
  - .3 Section 27 11 00 Communications Room Fittings
  - .4 Section 27 16 00 Connecting Cords, Devices and Adaptors

# 1.3 LIST OF TERMS AS USED IN THIS SPECIFICATION

- .1 "ISP": Inside Plant [cabling]
- .2 "OSP" Outside Plant [cabling]
- .3 "PIC": Plastic Insulated Conductor
- .4 "PVC": Polyvinyl Chloride
- .5 "PE": Polyethylene
- .6 "CMP": Communications Media Plenum [plenum rating]
- .7 "CMR": Communications Media Riser [riser rating]

#### 1.4 COMMUNICATIONS MULTIPAIR COPPER BACKBONE CABLING

# .1 Overview

- .1 The backbone configuration shall be a hierarchical star structure with separate dedicated cables from the MER Communications Room to each Telecommunications Room. The second level of backbone when required is used between buildings only, connecting the MER of each building to the campus Entrance room or a PABX room.
- .2 In a MER, Entrance and Intra Building Backbone cables shall be bundled separately from Horizontal cables.
- .3 In a TR Communications Room, Horizontal cables shall be bundled separately from Intra Building Backbone cables.
- .4 No backbone cables shall be left un-terminated in a Communications Room.
- .2 Category 3 Voice Intra-Building Backbone Cables
  - Voice backbone cabling consisting of multiples of 25, 50 or 100 pair Category 3 unshielded twisted-pair shall be installed by the Contractor, from the MER to each zone TR as directed by the Communications Consultant and or the PHSA NE Representative. The voice riser shall be sized by allocating 50 pairs per 929 m<sup>2</sup> (10,000 square feet). The pair count shall be rounded to the next 25 pair multiple. Example: 1022 m<sup>2</sup> (11,000 square feet) is 75 pairs.

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- .2 Multi-pair cable bundles entering GigaBIX mounts and the hinging of connectors shall be on the jumper side of the mount.
- .3 Backbone 25, 50 or 100-pair UTP cables from the same Communications room must be grouped together and terminated sequentially on the GigaBIX connectors; group the cables from each Communications room together. Once the first riser is terminated and numbered, every other riser in its group continues the number sequence. (Refer to Standard Drawing C-STD in 27 00 00.01).
- .4 Space for the protectors shall be provided to the left of the GigaBIX mounts. (Refer to Standard Drawing C-STD in in 27 00 00.01).
- .3 Category 3 Voice Inter-Building Backbone Cables
  - .1 Install and terminate a multi pair, UTP, 24 AWG outside plant cable between buildings for voice. The number of multi pair to be used varies depending on if it is serving an occupied or unoccupied office. For occupied office, the minimum number of multi pair to be used shall be 100. For unoccupied office, the minimum number of multi pair to be used shall be 25. The cable shall have a gel-filled core. Provide primary protection at both ends or as required by the AHJ. If the cable is routed underground, it shall be installed in conduit. The conduit shall be sized with 100 % spare cable capacity based on a fill of 40%. Terminate the cable on GigaBIX terminations.

#### PART 2 PRODUCTS

#### 2.1 MULTIPAIR INSIDE UNSHIELDED TWISTED PAIR CABLE

- .1 Intra-building Application:
  - .1 Cable suitable for indoor installation, between floors in vertical riser system, utility tunnels, under access flooring, and through overhead ceiling space (in cable tray, conduit & hangers).
  - .2 Each and every cable run shall have a continuous single cable, homogenous in nature. Splices are not permitted anywhere.
  - .3 Twisted pair PIC type, air core cable for intra-building cabling.
  - .4 Accepted Manufacturers: Belden and Commscope.
- .2 Conductors:
  - .1 Conductors of 24 AWG annealed solid copper.
  - .2 Conductors fully insulated, consisting of an inner layer of expanded polyolefin, covered with an outer layer (skin) of solid PVC.
  - .3 Twisted pair conductors, stranded into 25-pair bundles and into units.
  - .4 Colour Coding: Twisted pairs and units individually color-coded to industry standards (ANSI/ICEA Publications S-80-576, and TIA-230).
- .3 Core & Sheath
  - .1 Cable sheath consisting of an overall flame-retardant PVDF or equivalent jacket.
  - .2 Cable that is CEC rated as CMP or CMR as required by the authority having jurisdiction, and UL listed as such.
  - .3 Jacket Color: Grey
- .4 Performance:
  - .1 Electrical performance of the twisted pairs and overall cable that complies with TIA-568-C requirements for Category 3 UTP cabling.

# 2.2 SEALPIC-F CORE MULTIPAIR BACKBONE CABLE

- .1 Inter-building Application:
  - .1 Cable suitable for outdoor duct bank installation

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- .2 Each and every cable run shall have a continuous single cable, homogenous in nature. Splices are not permitted anywhere
- .2 Conductors:
  - .1 Conductors of 24 AWG annealed solid copper.
  - .2 Twisted pair conductors, stranded into 25-pair bundles and into units.
  - .3 Colour Coding: Twisted pairs and units individually color-coded to industry standards (ANSI/ICEA Publications S-80-576, and TIA-230).
- .3 Core & Sheath
  - All outdoor duct bank copper backbone cabling shall be SEALPIC-F backbone cabling, with solid copper conductors.
  - .2 The cable shall be CSA certified and stamped CMR rating.
- .4 Performance:
  - .1 Electrical performance of the twisted pairs and overall cable that complies with TIA-568-C requirements for Category 3 UTP cabling.

#### 2.3 TERMINATION EQUIPMENT

- .1 GigaBIX suitable for installation within a telecommunications facility for the termination of the backbone twisted pair cables and suitable for either wall or rack installations, vertically oriented for a wall mounted column configuration.
- .2 "GigaBIX" type.
- .3 GigaBIX accompanied by the quantity of management equipment, for both horizontal and vertical routing of cords and cross connect wires.
  - .1 GigaBIX kit, 300 pair, 5-pair based.
  - .2 Vertical management panel.
  - .3 Cable management module shall be provided behind each GigaBIX mount.

# 2.4 CROSS-CONNECT WIRE

- .1 Cross connect Wire, 1-Pair
  - .1 Cross connect wire suitable for installation within a telecommunications facility and fully compatible with the GigaBIX. Each and every cross connect wire manufactured from a single, continuous length of insulated wire, homogenous in nature. Splices are not permitted anywhere.
  - .2 Factory splices of insulated conductors are expressly prohibited.
  - .3 Conductors:
    - .1 Insulated Conductors: 24 AWG conductors of solid copper. Fully insulated conductors with a flame retardant thermoplastic material (such as PVC, or equivalent).
    - .2 Twisted Pairs: Two insulated conductors "twisted" into a "pair" (twisted pair), individually color-coded.

### PART 3 EXECUTION

# 3.1 INSTALLATION

- .1 Backbone Cable
  - .1 Cable runs shall have continuous sheath continuity, homogenous in nature. Splices are not permitted anywhere.
  - .2 Maximum cable length of 500 meters from the termination point within the Entrance Facility to the termination point in Communications Rooms.

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#### .3 Placement

- Maintain a minimum bend radius of 20 times the cable diameter during .1 installation and 10 times the cable diameter after installation.
- .2 Maintain pulling tension within manufacturer's limits.
- .3 Place cables within designated pathways.
- .4 Place and suspend cables in a manner to protect them from physical interferences or damage. Replace cables if damaged during installation.
- .5 Place cables with no kinks, twists, or impact damage to the sheath.
- .6 Place a pull rope along with cables where run in conduit and spare capacity still exists in the conduit. Tie off ends of the pull rope.

#### .4 Routing

- .1 When routing horizontally within Communications rooms, utilize the overhead cable support. When routing vertically within Communications rooms, utilize the vertical cable support (vertical basket tray) and provide cable ties every 610mm (24") on centre.
- .2 Route cables a minimum of 50mm (2") away from power sources to reduce interferences from EMI.
- .3 Provide minimum 7.62 meters (25') sheathed cable slack loop at each end of the run. Coil and place the slack on wall outside and above the overhead cable trav.
- .4 All cabling must be supported by fire-resistant fastenings and fixings.

#### .5 Termination

- Properly strain-relieve cables at termination points per manufacturer's .1 instructions.
- .2 Terminate twisted pairs onto the GigaBIX in accordance with manufacturer's latest instructions and TIA-568D standard installation practices.
- Perform post-installation testing as described in the Testing for .3 Communications specification.

#### .2 **GigaBIX**

- Provide accessories required for a complete installation.
- Install cable management module layout such that the 1st cable management .2 module starts at 203mm (8") from the wall and 457mm (18") from the floor.
- .3 Mount GigaBIX plumb and square.
- GigaBIX Distribution for Voice Tie Cables .3
  - Install patch panels in data rack as per CSTD -10 series drawings. Label front of voice tie patch panel as VP1, VP2, etc.
  - .2 Provide minimum 2x25 pair per rack or as specified from the rack Voice Tie Distribution panel to GigaBIX wall mount.
  - Terminate all 25 pairs on GigaBix 25-pair connector. Terminate the other end on .3 the rack-mount 24-port patch panel on discreet RJ45 jacks. Terminate 1 pair per port, pins 4 and 5. Terminate pair #24 and pair #25 on port #24 (pins 4 and 5, and pins 3 and 6).

#### .4 Cross connects

- At the Main Cross-connect, provide one 1-pair cross connect to length from the equipment field to the backbone field based on the records from the TR cross connections.
- .2 Utilize the horizontal and vertical management components to properly route the cross connect wire.
- Splices in cross connect wire are prohibited. .5
- Rack-mount Phone System .6
  - Where there's a rack-mount phone system, it shall be installed and tied with .1 several 25-pair Category 3 Amphenol cables to the GigaBIX wall to access the voice backbone cables. The Amphenol connector end of the cable shall be

# Section 27 13 13 COMMUNICATIONS COPPER BACKBONE CABLING

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terminated on each phone media gateway. The other loose end of the cable shall be terminated on GigaBIX 25-pair connector on a new column of GigaBIX blocks positioned in sequence to the last column for the regular voice tie cables. The termination area of the voice tie cables shall be on the upper half of the GigaBIX wall.

# **END OF SECTION 27 13 13**

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#### 27 13 23 COMMUNICATIONS FIBER BACKBONE CABLING

#### **NETWORK CORE REQUIREMENT**

A requirement to clarify intention regarding the single-mode fibre topology described within the cabling specification. The intended design for single mode backbone cabling is to have no passive patch points between the two locations of active equipment, they create extra points of documentation, failure, troubleshooting, as well as consume more space. For any transitions from intra-building SM fibre to interbuilding SM fibre 1:1 fusion splicing is expected, no passive patching environments. The end point locations for the purposes of single-mode fibre are: The telecommunications room, entrance facility, or other defined IT spaces requiring single-mode fibre and the Main Equipment Room(s) that contain the active network equipment. For campuses with more than 2 Main Equipment Rooms please engage the Network Core resource assigned to the project to confirm the required destinations. Full path diversity is to be maintained as defined in the specifications.

### PART 1 GENERAL

#### 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 List of terms as used in this specification
- .4 Communications Fiber Backbone Cabling

### 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.
  - .2 Section 27 01 10 Basic Requirements
  - .3 Section 27 08 11.01 Fiber Optic Testing
  - .4 Section 27 11 00 Communication Room Fittings
  - .5 Section 27 16 00 Connecting Cords, Devices and Adaptors

# 1.3 LIST OF TERMS AS USED IN THIS SPECIFICATION

- .1 In addition, define the following list of terms as used in this specification as follows:
  - .1 "MM": Multimode (Fiber type OM5 or better).
  - .2 "OFNP": Optical Fiber Non-conductive, plenum rated.
  - .3 "OFNR": Optical Fiber Non-conductive, riser rated.
  - .4 "OFCP": Optical Fiber Conductive, plenum rated.
  - .5 "OFCR": Optical Fiber Conductive, riser rated.
  - .6 "PVC": PolyVinyl Chloride.
  - .7 "SM": Singlemode (fiber type OS2 or better).

#### 1.4 APPLICATION DRIVE DISTANCE

.1 Application drive distance assurance must be completed at the design draft phase based on Manufacturer channel attenuation tables.

#### PART 2 PRODUCTS

#### 2.1 FIBER BACKBONE CABLING

- .1 Fiber Optic Intra-building (Indoor) Backbone Cables (Refer to Standard Drawing C-STD in 27 00 00.01)
  - .1 Intra-building Backbone (SM)
    - .1 Transmission requirements shall meet or exceed all applicable requirements of TIA-568-C.3 & C.3.1 Specifications:
      - .1 OS2 SM distribution fiber, tight buffer, all dielectric.
      - .2 Shall be FT6 CMP plenum-rated (OFNP/OFCP) or FT4 CMR riser rated (OFNR/OFCR) as required by the AHJ.
      - .3 Cables shall be mechanically protected along their entire length using either interlocking armoured type or inner duct w/non-armoured tight buffered cable.
  - .2 Intra-building Backbone (MM)
    - .1 OM5 laser optimized Multimode distribution fiber, tight buffer, all dielectric.
    - .2 Shall be FT6 CMP plenum-rated (OFNP/OFCP) or FT4 CMR riser rated (OFNR/OFCR) as required by the AHJ.
    - .3 The fiber shall support 10 GIGABIT ETHERNET @ 400 meters. Operating at wavelength of 850 nm, it shall have maximum attenuation of 3.0dB/km for tight buffered fiber, and effective Modal Bandwidth of 4700 MHz/km.
    - .4 Cables shall be mechanically protected along their entire length using either interlocking armoured type or inner duct w/non-armoured tight buffered cable.
  - .3 Fiber Backbone Count (MM/SM) Network Core Requirement
    - Primary and secondary Fiber backbone cables consisting of OM5 multi mode and or OS2 single mode optical cables shall be installed through physically diverse paths with minimum 20-meter separation from two separate intermediate cross-connect rooms to each TR of the same building. One of the intermediate cross-connect shall be located in the MER, and the other intermediate cross-connect shall be located in a TR. Minimum strand count per cable shall be 24. Termination type shall be LC. For community sites, contact the PHSA Network Edge and Network Core Representatives to determine specific requirements as it relates to intra-building fiber type, strand count and diversity requirements.
    - 2 Fiber strand count shall be provided by PHSA.
- .2 Fiber Optic Inter-building Backbone Cables
  - .1 Acute Site
    - .1 Inter-building Backbone (SM)
      - 1 Transmission requirements shall meet or exceed all applicable requirements of TIA-568-C.3 & C.3.1 Specifications:
        - .1 OS2 SM OSP fiber, indoor/outdoor, OFCP/OFCR (as required by the AHJ), all dielectric c/w yellow overall jacket and inner cable jacket
        - .2 The fiber shall support 100 GIGABIT ETHERNET (100GBASE-LR4). It shall have maximum attenuation of 0.5 dB/km at 1310 nm and 0.5 dB/km at 1550 nm wavelengths.
        - .3 Cables shall be interlocking armoured type.

.2 Inter-building Backbone (MM)

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- .1 OM5 laser optimized Multimode OSP fiber, indoor/outdoor, OFCP/OFCR (as required by the AHJ), all dielectric.
- .2 The fiber shall support 10 GIGABIT ETHERNET (10G BASE-SR) @ 400 meters. Operating at wavelength of 850 nm, it shall have an effective Modal Bandwidth of 4700 MHz/km.
- .3 Cables shall be interlocking armoured type.
- .3 Fiber Backbone Count (MM/SM) Network Core Requirement
  - .1 Primary and secondary Fiber backbone cables consisting of OM5 multi mode and or OS2 single mode optical cables shall be installed from two separate intermediate cross-connect rooms of each building to Network Core A MER (primary fiber) and Network Core B MER (secondary fiber). Termination type shall be LC.
    - .1 Fusion splice OS2 in the two intermediate cross-connect rooms of each building straight through to Network Core A MER and Network Core B MER. One of the intermediate cross-connect shall be located in the MER, and the other intermediate cross-connect shall be located in a TR of the same building.
    - .2 Terminate OM5 in the two intermediate cross-connect rooms of each building. One of the intermediate cross-connect shall be located in the MER, and the other intermediate cross-connect shall be located in a TR of the same building.
  - .2 Primary and secondary Fiber backbone cables consisting of OM5 multi mode and or OS2 single mode optical cables shall be installed through physically diverse paths with minimum 20-meter separation from two separate intermediate cross-connect rooms in each building to Network Core A MER and Network Core B MER.
- .4 Network Core Fiber Backbone Count (MM/SM) Network Core Requirement
  - .1 Primary and secondary Fiber backbone cables consisting of OM5 multi mode and or OS2 single mode optical cables shall be installed from Network Core A MER (primary fiber) to Network Core B MER (secondary fiber). Minimum strand count per cable shall be 24. Termination type shall be LC.
  - .2 Primary and secondary Fiber backbone cables consisting of OM5 multi mode and or OS2 single mode optical cables shall be installed through physically diverse paths with minimum 20-meter separation from Network Core A MER to Network Core B MER.
- .5 Final fiber strand count shall be provided by PHSA Network Core Provincial Manager or Representative during design phase.
- .2 Community Site
  - .1 Contact the PHSA Network Edge and Network Core Representatives to determine specific requirements as it relates to inter-building fiber type, strand count and diversity requirements.

#### 2.2 FIBER OPTIC CABLE CONSTRUCTION

- .1 Application:
  - .1 Cable shall be suitable for indoor and or indoor/outdoor installation between buildings, floors, in vertical riser system, under access flooring, and through overhead ceiling space (in basket cable tray, conduit, and/or inner duct).
  - .2 Optical transmission performance shall not be significantly affected by environmental fluctuations, installation, or aging.
- .2 Singlemode fiber strands shall meet or exceed the following geometry criteria:

.1 Core diameter = 8.3 um.

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- .2 Mode field diameter =  $8.8 \, \text{um}$ ,  $+/-0.5 \, \text{um}$ .
- .3 Cladding diameter = 125 um, +/- 1.0 um.
- .4 Core/Cladding Concentricity = <0.8 um.
- .5 Minimum Tensile Strength = 100,000 psi.
- .3 Singlemode fiber strands shall meet or exceed the following performance criteria:
  - .1 Attenuation = 0.7 dB/km at 1310 nm and 0.7 dB/km at 1550 nm wavelengths, maximum.
  - .2 Cutoff wavelength = 1260 nm.
  - .3 Dispersion = 3.5 pa/nm km at 1550 nm.
- .4 Primary Coating:
  - .1 Each fiber shall be completely covered with a "primary coating" (acrylate material).
  - .2 Coating diameter = 250 um, +/- 5um.
- .5 Buffering
  - Each coated fiber shall be fully covered with a material extruded over and directly onto the coating. This shall be the tight buffer. Tight buffer diameter = 900um, +/- 5 um. Material = PVC, or equivalent flame retardant thermoplastic.
  - .2 Buffered strands shall be individually color-coded to meet the requirements of ANSI/TIA-598-A-1995. (Also, ref. ANSI/ICEA S-83-596-1994, and TIA-230)
- .6 Interlocking Armour:
  - .1 Strength Element: The cable shall have an internal strength element such as aramid yarn (e.g. Kevlar).
  - .2 Inner Jacket: The cable shall have a seamless inner jacket material (plenum rated thermoplastic) applied to and completely covering the internal components (fiber strands, strength element, other).
  - .3 Armour: The cable shall have an interlocking metallic armour applied spirally and longitudinally to and completely covering the cable.
  - .4 Outer Jacket: The cable shall have a seamless outer jacket material (FT4 or FT6 plenum rated thermoplastic) applied to and completely covering the armour.
  - .5 Tensile Strength: The cable shall have a 150 lb, minimum, rated load.
  - .6 Colours for armoured cables:
    - .1 OM5 Colour: The following colours shall be used on OM5 (inner/outer interlocking armoured jacket) and for inner duct containing OM5 without
    - .2 exception to differentiate from Violet-coloured OM4 and Aqua-coloured OM3
      - .1 Commscope Lime Green:
      - .2 Belden Lime Green.
    - .3 OS2 Colours: The following colours shall be used on OS2 (inner/outer interlocking armoured jacket):
      - .1 Commscope Yellow stripe:
      - .2 Belden Yellow.
      - .3 Yellow inner duct containing OS2 shall be used without exception.
  - .7 Where the fiber optic cable is non-armored, it shall be protected in inner duct.
  - .8 Inner Duct colour
    - .1 Lime Green shall be used for inner duct containing OM5 without exception.
    - .2 Yellow shall be used for inner duct containing singlemode cable without exception.
  - .9 Inner duct size:
    - .1 Minimum size is 25mm (1 inch)
    - .2 FT4 or FT6 rated as required by the AHJ

#### 2.3 TERMINATION EQUIPMENT

.1 High Density Optical Fiber Patch Panels

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- .1 Patch panels for Fiber Optic cabling shall be Commscope or Belden newest released high density 1U modular unit. If additional capacity is required substitute with newest released 4U panels.
- .2 Patch panels are to come complete with cover, LC connectors, and all other components required to terminate, splice, store and identify the fiber
- .3 1U Fiber Optic patch panels shall be capable of supporting a density of 144 LC connectors and accept MPO/LC/Splice cassettes.
  - .1 Equip with 24-fiber or 36-fiber Duplex LC adapters
  - .2 Equip with 24-fiber or 36-fiber Duplex LC MPO adapters
- .4 If wall mount unit is required due to rack or equipment mounting restrictions then Commscope or Belden wall mount enclosure/panel shall be used.
- .5 Provide splice cassette type terrmination hardware for all fiber connectivity.

#### 2.4 CONNECTORS

- .1 Multimode / Singlemode Fiber Optic Connectors LC Type.
  - 1 Materials
    - .1 Ferrule: ceramic (zirconia or alumina) with pre-radiuses finish/face.
    - .2 Connector housing: plastic.
    - .3 Connector shall meet or exceed Ultra PC performance (LC-UPC).
    - .4 Connector shall have an integral strain relief feature, including a bend limiting rear boot.
    - .5 Connector shall be installable via fusion splice connector for multimode.
    - .6 Connector shall be installable via fusion spliced pigtails for singlemode.
- .2 Different connectors may need to be applied to tie cables in order to extend Carrier services to the MER. Consult with the Communications Consultant and or the PHSA NE Representative regarding the termination requirements for Carrier services.

#### 2.5 FIBER MANAGEMENT COMPONENTS

- .1 Polygon Fiber Slack Storage Reel
  - .1 Fiber slack storage reel for supporting of fiber optic service loops at both ends.
  - .2 For INSIDE Fiber backbone cabling, one 305mm reel per cable (part number 8900-1).
  - .3 For OUTSIDE plant Fiber backbone cabling, one 610mm reel per cable (part number 8900-24).
  - .4 Refer to C-STD Drawings in 27.00.00.01 for the mounting method for slack storage reel.
- .2 Velcro Cable Ties
  - .1 Width: 19mm (0.75")

### PART 3 EXECUTION

### 3.1 INSTALLATION

- .1 Fiber Optic Installation
  - All fiber optic cable system work completed by the Contractor must meet quality approval as stipulated by the Communications Consultant and or the PHSA NE Representative. The following requirements must be met to gain system acceptance.
    - .1 Run the cable along the route identified on the plan drawings

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- .2 Install materials and equipment in accordance with applicable standards, codes, requirements and recommendations of national, provincial and local authorities having jurisdiction and with manufacturer's printed instructions.
- .3 Adhere to manufacturers' published specifications for pulling tension, minimum bend radii and sidewall pressure when installing cables.
- .4 Any scoring or pitting within the fiber core (regardless of test result) shall result in re-termination by the Contractor using a new connector. Any retermination shall be done at no cost to the Owner.
- .5 Provide 7.62 meters of fiber optic cable slack at both ends of all cables.
- .6 Fiber optic cable slack is required for all fiber cable installs, whether it is a tie cable between racks within the same room or a backbone cable between rooms.
- .7 All single-mode fiber shall be fusion spliced utilizing 900 micron pigtails supplied by the Contractor. The fusion splicer used must be fully automated with full X and Y alignment and shall employ fusion splice loss estimation. Fiber splice protection shall be via 3M heat shrink sleeves. Any splice as estimated by the splicing equipment must not exceed 0.03 dB. If test results show attenuation out of specification limits then the Contractor is responsible to troubleshoot the link and determine corrective procedures. Any re-splicing or pigtail replacement shall be at no cost to the Owner.
- .8 No manual fusion splicing shall be performed.
- .9 Fiber cable preparation, pigtail routing, and forming within the splice or distribution panel shall be as per manufacturer's training and printed instructions.
- .10 Leave dust plugs on couplers to keep dust out and to block lazer light if active gear is turned on and not connected at one end.

#### .2 Inner Ducts.

- 1 Where the fiber optic cable is non-armored in intra-building applications, it shall be protected in inner duct.
- .2 Innerduct is installed along the entire cable route when installed in cable tray, backbone EMT conduits and risers between communication rooms.

**END OF SECTION 27 13 23** 

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#### 27 15 00 HORIZONTAL CABLING

### PART 1 GENERAL

#### 1.1 SUMMARY

- .1 Summary
- .2 Related Sections

#### 1.2 RELATED SECTIONS

- .1 This section forms part of the PHSA Communications Infrastructure Standards and Specifications and is to be read, interpreted, and coordinated with all other parts of PHSA Communications Infrastructure Standards and Specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 08 11.03 Horizontal Cat6 & Cat6ATesting
  - .3 Section 27 11 00 Communication Room Fittings
  - .4 Section 27 15 00 Horizontal Cabling
  - .5 Section 27 16 00 Connecting Cords, Devices and Adaptors
  - .6 Section 27 21 33 Data Communications Wireless Access Points

# PART 2 PRODUCTS

#### 2.1 CATEGORY 6 HORIZONTAL CABLE

- .1 Approved cable shall be Commscope or Belden Category 6 UTP, 23AWG, 100-ohm solid copper, CMR or CMP rated as required by the AHJ. To enhance operational supportability, the two manufacturers shall not be mixed in a new or an existing building.
- .2 All horizontal cable and associated jacks, connectors, patch panels and faceplates shall be manufactured by Commscope or Belden.
- .3 Approved cable jacket colour is blue.
- .4 Refer to Appendices E.1 and E.2 for part numbers and details.
- .5 Site applications:

Project	Copper Cab	ing Commscope Product	Belden Product
	System	Line	Line
Acute Site – Renovation Project with existing CAT6 MER/TR	Category 6	Uniprise CS37	2400 series
Community Site – New Construction Project	Category 6	Uniprise CS37	2400 series
Community Site – Renovation Project	Category 6	Uniprise CS37	2400 series

# 2.2 CATEGORY 6A HORIZONTAL CABLE

.1 Approved cable shall be the latest Commscope or Belden Category 6A, UTP, 23AWG, 100-ohm solid copper, CMR or CMP rated as required by the AHJ. To enhance

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- operational supportability, the two manufacturers shall not be mixed in a new or an existing building.
- .2 All horizontal cable and associated jacks, connectors, patch panels and faceplates shall be manufactured by Commscope or Belden.
- .3 Approved cable jacket colour is blue.
- .4 Refer to Appendices E.1 and E.3 for part numbers and details.

.5 Site applications:

Project	Copper Cabling	Commscope Product	Belden Product
	System	Line	Line
Acute Site – New Construction Project	Category 6A	Systimax Cat. 6A	10GXS Cat. 6A
Acute Site – Renovation Project with new MER/TR	Category 6A	Systimax Cat. 6A	10GXS Cat. 6A
Wireless Access Points Wiring	Category 6A	Systimax Cat. 6A	10GXS Cat. 6A

#### 2.3 COMMUNICATIONS CONNECTORS

- .1 Jacks shall be of the latest and most reliable termination modules.
- .2 Category 6 and Category 6A UTP connectors shall be 8-pin modular jacks (RJ-45-style) terminated in T568A Wire Map configuration. The Jacks must accept RJ-45 modular plugs without causing any damage or degradation to the connectors or pins.
- .3 Approved colour for 8-pin modular jacks is black.

#### PART 3 EXECUTION

# 3.1 OVERVIEW

- .1 The horizontal configuration shall be a star structure with separate dedicated continuous cables run from the servicing zone Communications Rooms to the outlets on the same floor.
- .2 The maximum length of horizontal cable shall not exceed 80 m.
- .3 Where there is more than one Communications room on the same floor, Communications boundary lines shall be established so that horizontal cables shall not cross the lines to another zone to be served by another Communications room.
- .4 In a Communications Room, horizontal cables shall be bundled separately from Inter and Intra backbone cables.
- .5 All horizontal cables shall be terminated at both ends. CMR-CMP rated Velcro straps shall be used to support the cables depending on location. The straps shall be loosely tightened in such a manner that it can slide around cable bundle.
- .6 The use of Consolidation Points shall not be allowed.
- .7 Each cable shall be terminated at workstation outlets on eight-position modular jacks with pin/pair assignment wired to T568A.
- .8 The Contractor shall leave minimum 300 mm slack in the cable at the outlet box following termination. Too much slack at the point of termination may result in testing failures and too little slack can compromise future maintenance.
- .9 The Contractor shall neatly dress all cables within the Communications room to follow building lines, the objective being to provide a reasonable amount of slack into each cable run, while at the same time provide neatness and promote order as the cables migrate from the point-of-entry to the termination point.

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- .10 The minimum allowable balanced twisted-pair cable / cord bend radius is 4 times the outside diameter of the cable / cord.
- .11 The cable pair twist must be maintained as per the Manufacturer specifications at the point of termination.
- .12 Refer to the following documents for guidelines on installation:
  - .1 Manufacturer Installation Guideline Documentation.
  - .2 TIA-568-C and C.1, as well as C-STD Drawings in 27 00 00.01 for installation.

### 3.2 HORIZONTAL CABLE INSTALLATION

- .1 Faceplate Configuration (Reference C-STD Drawings in 27 00 00.01))
  - .1 Communications Outlet
    - .1 A standard Communications outlet shall have two 4-pair cables (Jacks 1 and 2 on a 4-port faceplate) terminated on rack mount patch panel.
    - .2 Two more 4-pair cables (Jacks 3 and 4) shall be pulled together at the same time to the 4-port faceplate on an as needed basis (cost effective).
    - .3 Jack 1, Jack 2, Jack 3 and Jack 4 can be used for any application (PC/VOIP/data services, analogue, PBX, business lines, ADSL, fax, alarm, security, access control, elevator, etc.).
- .2 All UTP cable system work completed by the Contractor must be inspected by the Communications Consultant and or the PHSA NE Representative.
- .3 Install materials in accordance with applicable standards, codes, requirements and recommendations of national, provincial and local authorities having jurisdiction and with manufacturer printed instructions.
- .4 Adhere to manufacturer published specifications for pulling tension, minimum bend radii and sidewall pressure when installing cables.
- When installing, ensure cable is not subjected to stress due to contact with tray/conduit support mechanisms, bonding lugs or any metal burrs within the support structure. Particular care must be taken when working around corners and offsets. Pulling lubrication must be used at all times to ensure a stress-free installation.
- .6 Cable dressing and termination procedures shall confirm to the following requirements:
  - When cables are pulled in and the area is not ready for termination, do not leave cables hanging off cable tray unsupported. They shall be bundled together and hung from a Velcro tie fixed to the wall at high level, or lifted back up onto the tray.
  - .2 All cable installation shall be done in a neat and tidy fashion. All cable dressing within the EF, MER and TR shall follow building lines.
  - Within the Communications rooms, for Category 6, provide one Velcro tie every 600mm (24"). For Category 6A, provide one Velcro tie every 300mm (12").
  - .4 Different cable types shall not be bundled together.
  - Cable shall be neatly dressed with no crossovers within the bundle. The Communications Consultant and or the PHSA NE Representative shall have final approval of cable dressing quality and any workmanship issues. Bundles shall be dressed using Velcro fasteners. Cables must not exhibit sheath deformation due to poor installation or bundle over-tightening. If cable dressing is not performed to the satisfaction of the Communications Consultant and or the PHSA NE Representative, the Contractor shall be responsible to re-install or re-dress the bundles at no cost to the Owner. Termination practices must strictly comply with manufacturer recommendations and all referenced wiring installation standards. Particular care must be taken to limit sheath removal length and pair untwisting at point of termination. For Category 6 and Category 6A, the twist should appear within 6.5 mm of pair termination on the connector.

.6 Cables shall be terminated in sequential order.

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- .7 At each Communications outlet follow the same termination practices as stipulated for the Communications Room.
- .8 In Communications Rooms, horizontal cables shall be bundled and terminated on patch panels. Refer to C-STD Drawings in 27 00 00.01.
- .9 In existing buildings where the GigaBix method of termination is used and shall be maintained for horizontal cabling, the use of patch panels is not permitted.
- .10 Horizontal distribution cables shall be loosely bundled in no more than 48 cables.
- .11 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.
- All cables shall be terminated in Communications Rooms and at Communications outlets. Leave no cables un-terminated unless specified in T drawings or as directed by the Communications Consultant and or the PHSA NE Representative.
- .7 Patch Cables (within the Rack)
  - Only 310mm (12") standard patch cable (based Grey) shall be used to patch between the panel jacks and the switch ports.
  - .2 Where clinical and vendor equipment resides near the bottom of the rack (provided rack space is available below the switch cluster) for patching to the horizontal cables that connect to their end devices, longer patch cables shall be used to route neatly through the horizontal and vertical cable managers based on shortest path.
- .8 Patch Cable Lengths
  - 1 Patch cables for data switches shall be 310mm (12") long (within the same rack). Category 6A and Category 6 cords must be 28AWG small diameter type.
  - .2 Patch cables for analog services, clinical and vendor equipment typically range from 914mm (3'), 152mm (5'), to 1828mm (7') (within the same rack).
  - .3 Patch cables for all workstations shall be 3m (10') long.
  - .4 Patch cables for wireless access points shall be 7.6m (25') long.
- .9 Harness Cables, Cross Connect Cables and Patch Cords
  - .1 In existing buildings where Category 6 horizontal cable is being installed and the GigaBIX method of termination is used, the Contractor shall install harness cables and cross connects.
  - .2 Harness cables shall be maintained for horizontal cabling. Harness Cables are installed from the GigaBIX cross-connect in the Communications Room to the Owner's equipment installed on the racks and bundled per individual switch in groups of 48 and breakout into bundles of 24 for accessing the switch from the left and right vertical cable management channels. Where there are 24 port switches, the harness cables shall be bundled in groups of 24 and breakout into bundles of 12 for accessing the switch from the left and right vertical cable management channels. Cable tie bar for supporting the harness cables shall be 150 mm (6") deep.
  - .3 The harness cables shall be 4-pair Category 6 of the same colour and shall meet the requirements of TIA 568-C.
  - .4 For Acute site, the quantity of harness cables to be supplied shall be equal to 100% of the total quantity of horizontal data cables installed raised to the next increment of 48. For example, if 100 horizontal data cables are installed then 100 harness cables raised to the next increment of 48 shall require 144 harness cables.
  - .5 For Community sites, the quantity of harness cables to be supplied shall be equal to the number of horizontal data and spare cables installed raised to the next increment of 48. The harness cables shall be all the same colour. One end of the patch cord shall have an 8 Position Modular Plug (RJ45 plug) with a boot installed. The other end shall be terminated on the GigaBIX wall.
  - .6 Copper harness cables shall be provided as part of the structured cabling system.

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- .7 If the Owner does not supply the rack mount equipment during cable installation, the cabling contractor is to coordinate with the Communications Consultant and or the PHSA NE Representative regarding the placement of the harness cables on the rack.
- .8 Data cross-connect jumpers shall be GigaBIX Cross-Connect Category 6 jumper wires or better.
- .9 The installation of the data jumper wire is part of this scope of work.

  Painting over any Communications cabling is strictly prohibited as it alters the flame and smoke characteristics of the cables. Painting over them obscures the flame-rating designations which are required to be printed on the jacket. It voids the Manufacturer's system application and performance warranties that are mandatory to gain Owner acceptance.

### 3.3 ACCESSIBILITY

- .1 Install all work in a manner that allows easy access for adjustment, operation and maintenance. Provide access panels where required to allow access to junction boxes and devices for maintenance purpose.
- .2 Locate access panels in service areas wherever possible. Do not locate in finished walls.

# 3.4 MISCELLANEOUS CABLES

.1 PHSA does not accept hybrid or under-carpet cabling.

#### 3.5 LIGHTNING PROTECTION

- .1 Primary Protectors for PoE equipment installed inside Communications Rooms:
  - .1 Provide Surge Protectors (Tripp Lite model number B110-SP-10G, 4–Pair Category 6A PoE Protector with Solid State technology, or equal or better) on each Horizontal cable run entering the building. See picture below. Backward compatible with Category 6 cables.
  - .2 Provide a #6 AWG Green Insulated Bonding Conductor from the Telecommunications Grounding Bus bar.
  - .3 Daisy Chain the #6 ground between each Horizontal cable Surge Protector.
  - .4 Bond the metallic conduit used for running the Horizontal 4-pair cables.
  - .5 Note: the Solid State modules are necessary for pass-through of PoE++ voltage. Surge Protector Installation is based on current CEC Code Section 60 and EIA/TIA 607-C.

In-Line Network Surge Protector – 10 Gbps



#### **END OF SECTION 27 15 00**

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#### 27 15 00.01 MODULAR FURNITURE

#### PART 1 GENERAL

#### 1.1 SUMMARY

- .1 Summary
- .2 Related Sections
- .3 Overview

#### 1.2 RELATED SECTIONS

- .1 This section forms part of the PHSA Communications Infrastructure Standards and Specifications and is to be read, interpreted, and coordinated with all other parts of PHSA Communications Infrastructure Standards and Specifications.
  - .1 Section 27 01 10 Basic Requirements
  - .2 Section 27 15 00 Horizontal Cabling
  - .3 Section 27 16 00 Connecting Cords, Devices and Adaptors

#### 1.3 OVERVIEW

.1 Unless specified otherwise, modular furniture system and custom millwork shall be designed to Commercial Building Standard for Telecommunications Pathways and Spaces, TIA-569-D. This defines the furniture pathways and spaces contained in work areas.

## PART 2 PRODUCTS

#### 2.1 FURNITURE PRODUCT

- .1 The modular furniture system and custom millwork must be functional, flexible, durable, replaceable and proven for cable infrastructure.
- .2 The quality of the Communications cutouts shall be robust in design to hold the Communications faceplate firmly in place to prevent it from being knocked out easily.
- .3 Belden and Commscope standard compliant modular furniture faceplates are specified to be used
- .4 The Communications faceplate cutouts shall meet the following dimensions:
  - .1 Belden faceplate cutout is 69 mm x 35.5 mm.
  - .2 Commscope faceplate cutout is 67.56 mm 69.95 mm x 34.04 mm 35.56 mm.
- The wiring channels (raceways) shall not have sharp / abrasive corners that can potentially damage Communications cables or power whips particularly at corners where cables make the bend.
- .6 The wiring channels shall be constructed of metal to hold the power and Communications outlets firmly in place. PVC raceway shall not be accepted.
- .7 The modular furniture shall have a versatile layout to enable a number of connected workstations in a cluster to be supported via top feed (system's pac pole), bottom feed or wall feed.
- .8 The wall panels shall be interchangeable. 610 mm or 1220 mm panels are more versatile than 914 mm or 1524 mm panels.

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.9 All custom and modular millwork furniture structured cabling wiring channels shall be sized according the BICSI standards max. 40% fill ratio after all the cabling is installed.

#### PART 3 EXECUTION

#### 3.1 INSTALLATION

- .1 The maximum furniture pathway fill shall be 40%. It is calculated by dividing the sum of the cross-sectional area of all cables by the most restricted cross-sectional area of the pathway. Cable fill capacity takes into consideration that there is unusable space between cables and that cables may take independent paths.
- .2 Where the raceway is joint-used, the power system shall be isolated from the Communications system by a metallic shield within the power cable or a metallic barrier separating the two.
- .3 Where ergonomic consideration ranks high, the power and Communications cut-outs and outlets shall be located on the wiring channel above the desk.
- .4 Where any furniture is placed against the wall, it shall have a back wall clearance at the bottom 457 mm AFF to access wall mount Communications and power outlets.

**END OF SECTION 27 15 00.01** 

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### 27 16 00 CONNECTING CORDS, DEVICES AND ADAPTORS

#### PART 1 GENERAL

#### 1.1 SUMMARY

.1 This section describes any cords, cross-connect wire, devices, and adapters required to connect the OSP, riser, and horizontal cabling as called for in these specifications and related drawings.

# 1.2 RELATED SECTIONS

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other sections of these specifications.
  - .1 Section 27 05 00 Common Works for Communications Systems
  - .2 Section 27 11 00 Communications Room Fittings
  - .3 Section 27 13 13 Copper Backbone Systems
  - .4 Section 27 13 23 Fiber Backbone Systems
  - .5 Section 27 15 00 Horizontal Cabling
  - .6 Section 27 21 33 Data Communications Wireless Access Points

### 1.3 COPPER AND FIBER PATCH CORDS

- .1 Division 27 Contractor shall identify the quantity of Category 6A patch cords for Wi-Fi and RTLS systems, and the quantity of Singlemode and Multimode patch cords.
  - All Category 6A patch cords used in Communications Rooms will be 28 AWG stranded with an outer diameter less than or equal to 4.72 mm (0.186 inches).
  - .2 All Category 6 patch cords used in Communications Rooms will be will be 28 AWG stranded with an outer diameter less than or equal to 3.83 mm (0.15 inches).
  - .3 Supply four Category 6A patch cords for each Telecommunications Outlet associated with the Category 6A cabling Wi-Fi grid (two for the access point and two for connection to the switch in the MER or TR.
  - .4 Supply two Category 6A patch cords for each Telecommunications Outlet associated with the Category 6A cabling RTLS Wireless grid (one for the access point and one for connection to the switch in the MER or TR.
  - .5 Supply multimode and single mode patch cords required for port activation at the time when the building turns operational. The final amount and the variety of lengths of the patch cords will be provided to the Division 27 Contractor by the Authority.
- .2 The Contractor is responsible to provide as a base all patch cords (fiber, copper) and cross connect jumpers required to activate equipment (IMIT, clinical and builder provided equipment) and systems that are within the scope of the contract. This includes any patch cords and cross connect jumpers required for the integration of systems as well. Lengths shall be determined in consultation with the Authority prior to the procurement of the patch cords.

#### PART 2 PRODUCTS

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# 2.1 COMMUNICATIONS ROOM COPPER PATCH CORDS

- .1 The Contractor is responsible to provide all copper patch cords required to activate equipment and systems.
- .2 For voice analogue services, if no count of patch cords is provided during tender, a quantity equalling 25% of the total copper patch panel port count shall be provided, of which 50% shall be 2.1m (7') and the other 50% shall be 3m (10').

#### 2.2 WORK AREA COPPER CONNECTING CORDS

- .1 In renovation projects, during project design stage and prior to tender, the Health Authority's IMIT Project Manager or Technical Project Manager shall confirm the workstation patch cord count with the Communications Consultant for stipulation into the scope of work statement. The count shall take into consideration all types of equipment and systems that require network connectivity including clinical equipment systems, security systems and FM systems as well as all forms of connected equipment. If no count of patch cords is provided during tender, a quantity equalling 10% of the total horizontal drop count shall be provided.
- .2 In new construction or redevelopment projects, the Builder is responsible to provide all workstation patch cords required to activate equipment and systems, plus 5% spare patch cords over above that if no sparing formula is stipulated.
- .3 Patch cables for all workstations shall be 3m (10') long.

# 2.3 COPPER CONNECTING CORDS FOR WIRELESS ACCESS POINTS

.1 Refer to Section 27 21 33.

# 2.4 COMMUNICATIONS ROOM FIBER PATCH CORDS

- .1 Fiber Cord –LC Duplex.
  - .1 Fiber patch cord suitable for indoor installation within a fiber patch panel.
  - .2 Cord assembled from a single, continuous length of cordage, homogenous in nature; Splices are not permitted.
  - .3 Cords terminated at both ends via specified connector type.
  - .4 Colours
    - .1 The following cable sheath colours shall be used on OM5 without exceptions to differentiate from Violet-coloured OM4 and Aqua-coloured OM3:
      - .1 Commscope Lime Green.
      - .2 Belden Lime Green.
    - .2 For singlemode patch cords, a yellow sheath colour shall be used.
  - .2 Fiber Patch Cords shall be Commscope or Belden MM/SM, LC/LC Duplex.
  - .3 Typical MM/SM patch cord lengths and quantity shall be:
    - A mixture of 1.5m (5'), 2.1 m (7'), 3m (10'), and 4.6m (15'), 6.1m (20') and shall be verified with Communications Consultant and or the PHSA NE Representative.
    - .2 Communications closet requirements: 240 horizontal copper cables require 8 fiber patch cords. Verify quantities with the PHSA NE Representative.

# 2.5 CROSS-CONNECT WIRE

.1 Where IDC blocks are used, Contractor shall supply and install cross connection wires. All voice cross connections shall be neatly routed via D-rings and bundled with Velcro wraps.

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- .2 Wires shall be 24 AWG solid tinned copper, 1-pair Category 3. Conductors shall be insulated with semi-rigid PVC. One insulated conductor in a pair shall be white and the other in visibly distinct solid colour. Pair-untwist shall not exceed 75mm from the point of termination.
- .3 The quantity of cross connection wires shall be 24 pairs per 24 port voice tie cable patch panel, plus 10% spare.

#### PART 3 EXECUTION

#### 3.1 DUPLEX FIBER POLARITY GUIDELINES FOR SC/LC CONNECTORS

- .1 Introduction, refer to TSB-125 Reserve Pair Positioning
  - .1 Most fiber systems today are based on transmission along fiber pairs, using one fiber for one direction of signal propagation and the other fiber for the opposite direction. When installing and maintaining these systems, it is important to make sure that the signals are kept on the correct fibers, so that the transmit-to-receive polarity is always maintained.
  - Duplex crossover cords and pair-wise crossover backbone wiring greatly simplify cable administration for this type of optical fiber network. When installed correctly, these systems automatically ensure proper signal polarity, so end users do not need to worry about maintaining transmit and receive signal integrity at connection points.

# .2 General Principles

- All duplex opto-electronic transceivers within the same application (Ethernet for example) have the same transmit and receive port positions. When looking into the ports of the transceiver with the keyways of the receptacle facing up, the transmitter is on left and the receiver on the right.
- .2 When connecting transceivers together, the signals must cross over. The crossover connects the transmitter of one device to the receiver of the second device.
- .3 All individual elements of a channel shall provide a crossover. Channel elements include every patch cord, every adapter (coupling), and every cable segment between patch panels.
- There are always an odd number of elements in a channel, whether the channel is made from a single patch cord or a concatenation of many cables and cords.
- .5 The net effect of an odd number of crossovers is a single crossover.

# 3.2 PHSA PATCHING METHODOLOGY

- .1 Patch Cables (within the Rack)
  - Only 310mm (12") standard patch cable (based Grey) shall be used to patch between the panel jacks and the switch ports.
  - .2 Where clinical and vendor equipment resides near the bottom of the rack (provided rack space is available below the switch cluster), for patching to the horizontal cables that connect to their end devices, longer patch cables shall be used to route neatly through the horizontal and vertical cable managers based on shortest path.
- .2 Patch Cable Lengths
  - .1 Patch cables for data switches shall be 310mm (12") long (within the same rack).
  - .2 Patch cables for analogue services, clinical and vendor equipment typically range from 914mm (3'), 152mm (5'), to 1828mm (7') (within the same rack).
  - .3 Patch cables for all workstations shall be 3m (10') long.

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.4 Patch cables for wireless access points shall be 7.6m (25') and up to 13m (42') in length.

**END OF SECTION 27 16 00** 

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#### 27 21 33 DATA COMMUNICATIONS WIRELESS ACCESS POINTS

#### PART 1 **GENERAL**

#### 1.1 **SUMMARY**

- .1 Summarv
- Cabling for Wireless .2
- .3 Wireless Installation

#### 1.2 **CABLING FOR WIRELESS**

- .1 TSB-162-A provides guidelines for pre-cabling a building using a grid approach. The precabled grid makes the building ready for a wireless infrastructure at any time simply by plugging a wireless access point into a ceiling Communications outlet. The square cell structure helps designers determine how much cabling shall be required for the WLAN and it allows for flexibility for coverage (AP density), capacity and growth in the wireless infrastructure.
- .2 A grid is a collection of uniform cells where each cell is a square. The ceiling Communications outlet is at the centre of the cell. The size for a square shall be 10.0m x 10.0mfor seamless wireless access point coverage for both 5 Ghz frequency range and
- .3 2.4 GHz. Note: this cell size has been deemed appropriate for a Healthcare setting. For underground parking and parkades, it may be permissible to increase the cell size to 15m x 15m with approval from the PHSA NE Representative.
- The wireless grid is for the installation of horizontal cable outlets (not access points) in .4 the ceiling at strategic locations (every 10 meters square). A wireless survey is performed after the space is populated with walls, equipment layouts and finishes (furniture) to determine where and how many wireless access points are required for the desired coverage. This cabling deployment shall ensure that when the wireless environment changes over the lifetime of the institution, there shall be a ceiling outlet available for the new or relocation wireless access point.
- In large medical educational spaces with high occupancy such as classrooms. .5 conference rooms and auditoriums, requirements for higher than average access point density to support a larger number of wireless devices may drive the need for additional outlets over and above what the 10m x 10m grid shall allow for. Refer to Table 3 in TIA PN-4966 and contact the PHSA NE Representative for specific direction.
- The ceiling Communications outlet is to be located at the centre of the square cell. .6
  - .1 Patch cords to be provided that allow an access point to be installed anywhere
  - A ceiling Communications outlet is required for any partial cell.
- .7 To ensure contiguous and ubiquitous wireless coverage, the wireless cabling grid shall cover all areas within the deployment scope including utility spaces (mechanical, electrical, elevator machine, communication rooms), stairwells, parking levels, service links and tunnels. The wireless access point ceiling Communications outlet nearest to the perimeter of the building shall be within 5 meters of all building edges to provide a complete wireless grid coverage for the entire floor plate.
- .8 Wireless communications outlets with two Category 6A Data Drops are to be located at the centre of each square cell. Where only a portion of a square cell resides within the interior of the Facility (such as at the Facility's perimeter), a wireless communication

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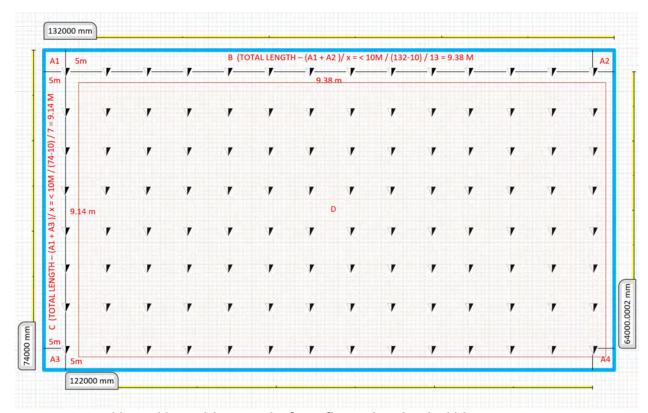
outlet with two Category 6A Data Drops shall still be provided in the interior of the Facility for that cell. Specific installation method of the communication outlet, pathways and cabling shall vary depending on the type of ceiling and location.

- .9 If required, Communication outlets shall be installed in exterior locations (lamp posts, exterior walls, etc.) so that wireless coverage can be provided outside the building. The location and quantity of exterior Communication outlets for wireless coverage shall be determined in consultation with the Communications Consultant and or the PHSA NE Representative. If the cabling length between the nearest Telecommunication Room and the exterior wireless communication outlet exceeds 80m, fiber and power shall be provided to each access point location identified by the PHSA NE Representative. In this instance, all associated equipment, power and connecting hardware shall be mounted on the wall of the Communications room. They shall not be located in network racks or cabinet. Refer to C-STD drawings in 27 00 00.01, specifically C-STD-039, drawing title Communications Media Converter Detail.
- .10 Power shall typically be delivered through the horizontal cabling.

### 1.3 DESIGN GUIDELINE FOR A WIRELESS GRID

- .1 The guideline below is intended to assist the Design-Builder in the design of the wireless cabling grid.
- .2 When laying out the Category 6A cabling grid on each floor of the Facility, the general guidance to be followed for the Design is to:
  - .1 Place TOs in the interior of the Facility five (5) meters off of all exterior perimeter walls (See example below steps A1 thru A4);
  - .2 Divide the remaining length of each perimeter wall equally to get as close as possible to 10m between outlets without going over 10m (See example below steps B & C). Completion of this step will establish the TO spacing for the Category 6A cabling grid;
  - .3 Once the TO spacing is determined along the perimeter walls, populate the remainder of the floor area applying the same spacing to establish the Category 6A cabling grid for entire floor (see example below – step D);
  - .4 Adjust the placement of specific TOs as required to resolve accessibility issues and conflicts with architectural, structural and other design elements (examples: interior partitions, columns, shafts, elevators, large equipment (such as generators, air handlers, boilers, etc.), etc.). In areas where there are high ceilings, the Design of the Category 6A cabling grid will need to be approached differently and in consultation with the Authority; and
  - .5 Augment the Category 6A grid with additional TOs as required or as specified the Statement of Requirements.

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10m x 10m grid example: for a floor plan that is 132m x 74m

### PART 2 PRODUCT

### 2.1 SEE HORIZONTAL CABLING SECTION 27 15 00

### PART 3 EXECUTION

### 3.1 WIRELESS INSTALLATION

- .1 PHSA is responsible for:
  - .1 The design of the facility's wireless (WIFI) network and the procurement, configuration and commissioning of all wireless and wired network hardware including access points, antennas, switches and controllers.
  - The procurement, configuration and commissioning of all hardware and software related to wireless network management systems and tools.
  - .3 Providing centralized authentication and security appliances or latest equivalent to support the wireless network within the Facility.
  - .4 The procurement of all standard vendor supplied access point mounting brackets, lighting arrestors and accessories required to install wireless hardware.
  - .5 Conducting all predictive, active and passive wireless RF surveys necessary to determine access point placement and to validate and calibrate the wireless network to ensure all required technical parameters (coverage, SNR, etc.) are met.

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- .6 Identifying the mounting locations for all wireless hardware. To assist in the correct installation of wireless hardware, PHSA shall provide drawings, written instructions and or pictures detailing mounting locations and, where possible, shall also identify access point and antenna locations on site.
- .7 Labelling and supplying the wireless access points, antennas, mounting brackets and other standardized hardware based upon a mutually agreed to schedule.
- .2 In general, the responsibility of the builder, project consultants and the Division 27 Contractor in the deployment of a wireless infrastructure are as follows:
  - .1 Furnishing PHSA with all documentation required to accurately complete a software based predictive wireless survey. This includes, but is not restricted to floor plans, reflective ceiling plans, elevations and section drawings, furniture and equipment layouts and information on building materials and finishes. The Builder and or the project consultants are required to keep the PHSA NE Representative appraised of all changes to this documentation throughout the course of constructing or renovating the Facility.
  - .2 Designing the Facility including equipment locations (e.g., microwave ovens) in a manner that does not introduce interference beyond the noise floor and impact signal strength requirements (SNR) of the wireless network. The resulting RF environment in the Facility must be consistent with the strictest specifications of the wireless end-use equipment.
  - .3 Providing PHSA and its representatives with access to the site during construction to conduct wireless RF surveys and testing.
  - .4 Supplying, installing, testing and certifying a horizontal cabling grid throughout the facility's ceiling spaces to connect wireless access points.
  - .5 Installing all access points, antennas and associated accessories and hardware as prescribed by PHSA's wireless design.
    - .1 Wireless network hardware provided to the Contractor for the interior of the Facility shall not be installed until the building is enclosed, weather tight, temperature and humidity conditions are approximately the same as final conditions expected, wireless cabling grid is installed and tested, most construction activities are complete and surfaces have been swept and treated for dust control. The Contractor shall not be allowed to install wireless and wired network hardware until PHSA has inspected the interior building conditions and provided written approval to proceed with the installation.
    - .2 Prior to receipt of wireless network hardware and components for installation, the Contractor is required to provide PHSA with as-built documentation of the wireless cabling grid identifying the cable IDs associated with each wireless communication outlet.
    - .3 Upon receipt of wireless and wired network hardware and components, the Contractor shall be financially responsible for any damage or disappearance of PHSA provided material due to improper handling and storage, negligence, fire, theft and environmental conditions during construction.
  - .6 Moving and or adding wireless network hardware as prescribed by PHSA after completion of pre and post occupancy wireless surveys. In addition to labour and equipment, the Contractor is required to cover all costs associated with moving access points such as replacement of ceiling tiles and the installation of sleeves through walls.
  - .7 Installing two patch cords between each access point and its designated wireless outlet as specified in PHSA's design. If required due to the ceiling type, the Contractor shall install conduit to run the patch cords between the wireless communication outlet and the access point. In the Communications Room, the

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- Contractor must also install two patch cords to connect the access point to the switch ports designated by PHSA.
- .8 Installing lightning arrestors and associated grounding on all outdoor access point locations where specified by PHSA. The Contractor shall also be required to supply and install surge protectors in Communications Rooms for each horizontal cable run entering the building.
- .9 If the mounting of wireless hardware requires the procurement of non-standard or specialty mounts, brackets, vanity skins or covers or the fabrication of custom solutions, the Contractor shall be expected to bear all associated design, fabrication, procurement and installation costs. Furthermore, if alterations in the design, fabrication and installation of components provided by others are needed to install any aspect of the wireless infrastructure then the Contractor shall be expected to bear the full cost of all such customization.
- .10 For the safety of patients and staff, the Contractor shall be required to supply, install and label ceiling (hard cap and tile) enclosures to house wireless hardware in areas of the Facility specified by the Communications Consultant and or the PHSA NE Representative. These enclosures shall hide wireless hardware from view and or prevent unauthorized access to the access point and the connecting cabling. The enclosures provided must allow RF transmissions to penetrate with little or no attenuation and match the surrounding ceiling colour. Prior to purchase of the enclosures, the Contractor shall submit shop drawings to the Communications Consultants and or the PHSA NE Representative for approval and, if required, provide samples for RF testing purposes and to check for interoperability with wireless hardware.
- .11 To protect wireless hardware from the environment, theft or vandalism, the Contractor shall be required to supply, install and label indoor/outdoor NEMA rated access point enclosures in certain areas within and outside the Facility as specified by the Communications Consultant and or the PHSA NE Representative. The enclosures must be able to protect wireless hardware from wet and dirty environments, UV stabilized for exposure to directly sunlight, virtually transparent to wireless signals, lockable and work with all variations of provided wireless hardware. Prior to purchase of the enclosures, the Contractor shall submit shop drawings to the Communications Consultants and or the NE Representative for approval and, if required, provide samples to PHSA for RF testing purposes and to check for interoperability with wireless hardware.

## 3.2 INSTALLATION (INDOOR)

- .1 Regardless of the location and mounting method of the wireless access point, <u>maximum</u> permanent link length is 80 meters.
- .2 Two horizontal cables shall be installed to each wireless Communications outlet. Terminate two horizontal cables on Belden or Commscope jack.
- .3 Mounting Scenarios for different ceiling types:
  - .1 Solid (drywall) ceiling:
    - .1 The dual horizontal cable runs are to be installed in conduit between the ceiling Communications outlet box and the nearest cable tray.
    - .2 Patch cords are to be fished across solid ceilings between the ceiling Communications outlet box and the wireless access point location.
    - .3 The standard patch cord length used to connect to the wireless access point is 25' / 7.62m. Store and support any slack length in the ceiling above the access point.
    - .4 The ceiling Communications outlet box to be mounted above ceiling for the termination of horizontal runs.

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- .1 Ceiling Communications outlet box is a 100mm x 100mm x 54mm with a 100mm x 100mm shoe box steel cover for a 4-port decora strap.
- .2 faceplate
- .3 The ceiling Communications outlet box shall be fastened directly to the ceiling's structural support member with a Caddy clip and/or screws no more than 305mm above the access hatch opening.
- .5 An access panel (305mm x 305mm) shall be installed at the ceiling Communications outlet box location (painting is by the contractor).
- .6 Wireless access point installation (directly) to ceiling using vendor supplied mounting bracket.
- .7 All access points must be seismically restrained.
- .8 Label the wireless access point, faceplate, patch cords and the access hatch For identification requirements, refer to Section 27 05 53.
- .2 Exposed ceiling (Parkade, utility spaces, stairwells, etc.):
  - .1 The dual horizontal cable runs are to be installed in conduit between the ceiling Communications outlet box and the nearest cable tray. If it is determined after completion of the survey that the ceiling Communications outlet box is to be used in the initial deployment, a 27mm conduit shall also be installed for the patch cords to the access point location.
  - .2 Use a standard patch cord length that closely matches to the length of the conduit between the ceiling Communications outlet box and the wireless access point. Store any slack length in the ceiling Communication outlet box and/or electrical box supporting the wireless access point.
  - .3 Ceiling Communications outlet box to be mounted to the ceiling for the termination of horizontal runs.
    - .1 Ceiling Communications outlet box is a 150mm x 150mm x 100mm with a solid cover plate. Locate a 2-port Surface jack Assembly inside the JB
  - .4 Install wireless access point to a 100mm x 100mm x 54mm electrical box using supplied mounting bracket or alternatively inside a wireless enclosure or to specialty mount as required
  - .5 All access points must be seismically restrained.
  - .6 Label the wireless access point, ceiling Communications outlet box, surface jack assembly and patch cords.
- .3 Accessible (T-bar) Ceiling:
  - .1 The dual horizontal cable runs are to be installed in conduit between the ceiling Communications outlet box and the nearest cable tray.
  - .2 Patch cords are to be fished across ceilings between the ceiling Communications outlet box and the wireless access point location.
  - .3 The standard patch cord length used to connect to the wireless access point is 25' / 7.62m. Store and support any slack length in the ceiling above the access point.
  - .4 The ceiling Communications outlet box to be mounted above ceiling for the termination of horizontal runs
    - .1 Ceiling Communications outlet box is a 100mm x 100mm x 54mm with a 100mm x 100mm shoe box steel cover for a 4-port decora strap.
    - .2 The ceiling Communications outlet box shall be fastened directly to the ceiling's structural support member with a Caddy clip
  - .5 Wireless access point installation (directly) to ceiling Main Tee using vendor supplied mounting bracket.
  - .6 All access points must be seismically restrained.
  - .7 Label the wireless access point, faceplate and patch cords and the T-bar ceiling grid. For identification requirements, refer to Section 27 05 53.

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- .4 In mounting scenarios that don't meet with the examples above, the Communications Consultant and or the PHSA NE representative is to be consulted.
- .5 Wireless Access Point Enclosures:
  - .1 In a Mental Health setting with an anti-ligature requirement, hard cap and/or tile ceiling enclosures may be required to house wireless hardware in specific areas. These enclosures shall hide wireless hardware from view and or prevent unauthorized access to the wireless access points and the connecting patch cords.
  - .2 To protect wireless hardware from the environment, theft and vandalism, NEMA rated indoor/outdoor enclosures shall be required in certain areas within and outside a facility. These enclosures shall protect wireless hardware from wet and dirty environments and shall be UV stabilized, virtually transparent to wireless signals and lockable.
  - .3 All types of wireless access point enclosures shall be supplied by the Division 27 Contractor.
- .4 Division 27 Contractor to label the exterior of the Wireless Access Point Enclosure.
   .6 At the communications room end, the wireless cabling from the same drop location shall be distributed evenly across patch panels for patching to different switches within each rack.
- .7 Two horizontal patch cords shall be plugged into each wireless outlet. The maximum length of the patch cords allowed is 7.62m (25'), The use of patch cords between the Communications outlet and the AP enables moving the AP around within the cell for specialized coverage. If a larger cell size is approved in underground parking levels and parkades, the patch cord length may be as long as 13m as specified in TSB-162-A.
- .8 The method of mounting the outlet shall suit the level of security at each location. PHSA to be consulted for security detail.
- .9 For all outdoor wireless access point installation, the applicable CEC and BC codes shall govern the location, mounting, grounding and type of service cable and enclosures used. Reference "Outdoor Cabling" in Horizontal Section.
- .10 Staircases must be included in cabling infrastructure. AP deployment shall be based on a wireless outlet per landing starting at the first landing.
- .11 Every lobby must include cabling infrastructure for AP deployment to ensure wireless coverage for the elevator cars.
- .12 The installation of reusable Nite Ize KeyRing Locker stainless steel S-Biner MicroLock with center locking lever (part number KRGSM-07-R3) shall be part of an AP installation or replacement work. Prefabricated holes in the AP and in the bracket shall line up with one another once the AP is mounted correctly. A KeyRing Locker S-Biner through these holes shall be used to secure the AP and prevent it from falling out of the bracket.
- .13 All AP devices attached to the ceilings are to be seismically restrained as per the BC Building Code and the onsite FMO requirements. A Seismic Engineer is required to sign off on the installation including the associated assemblies and the KeyRing.



**END OF SECTION 27 21 33** 

# 27 00 00.01 COMMUNICATIONS STANDARD - DRAWINGS

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C-STD-019         Communications Wiremold 4000 & 6000 Series Details         4           C-STD-020         Communications Wiremold Details         4           C-STD-021         Communications Receptacle Details         4           C-STD-022         Future         4           C-STD-023         Communications Labeling Diagram         4           C-STD-024         Communications Typical Faceplate Labeling         4           C-STD-025         Future         4           C-STD-026         Future         6           C-STD-027         Communications Cable Support Details for 4000 & 6000 Wiremold Vertical Riser         4           C-STD-027         Communications Typical Connection Between Conduit and 4000/6000 Wiremold         4           C-STD-028         Communications Typical Connection Between Conduit and 4000/6000 Wiremold         4           C-STD-030         Future         6           C-STD-031         Communications Panduit LDP-010 Series Non Metallic Details         4           C-STD-032         Communications Reverse Fiber Pair Positioning         4           C-STD-033.1         Communications Reverse Fiber Pair Positioning         4           C-STD-033.2         Communications (HILTI) Speed Sleeve Ganging Plate CFS-SL GP 16° and 24°         4           C-STD-033.3         Communication	C-STD-017	Communications Suspended Fluorescent Luminaire Mounting Details	4					
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C-STD-021         Communications Receptacle Details         4           C-STD-022         Future         4           C-STD-023         Communications Labeling Diagram         4           C-STD-024         Communications Typical Faceplate Labeling         4           C-STD-025         Future         6           C-STD-026         Future         6           C-STD-027         Communications Cable Support Details for 4000 & 6000 Wiremold Vertical Riser         4           C-STD-028         Communications Typical Connection Between Conduit and 4000/6000 Wiremold         4           C-STD-028         Future - Communications Fiber Panel Label         6           C-STD-030         Future         6           C-STD-031         Communications Panduit LDP-010 Series Non Metallic Details         4           C-STD-031         Communications Reverse Fiber Pair Positioning         4           C-STD-032         Communications Reverse Fiber Pair Positioning         4           C-STD-033.1         Communications Typical Fire Stopping Details         4           C-STD-033.2         Communications (HILTI) Speed Sleeve Ganging Plate CFS-SL GP 16° and 24"         4           C-STD-033.3         Communications (HILTI) Cast-In-Place / Speed Sleeve F-A-3060 System Drawing         4           C-STD-034         Commun	C-STD-019	Communications Wiremold 4000 & 6000 Series Details	4					
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C-STD-026 Future C-STD-027 Communications Cable Support Details for 4000 & 6000 Wiremold Vertical Riser C-STD-028 Communications Typical Connection Between Conduit and 4000/6000 Wiremold C-STD-029 Future - Communications Fiber Panel Label C-STD-030 Future C-STD-031 Communications Panduit LDP-010 Series Non Metallic Details 4 C-STD-032 Communications Reverse Fiber Pair Positioning 4 C-STD-033.1 Communications Typical Fire Stopping Details 4 C-STD-033.2 Communications (HILTI) Speed Sleeve Ganging Plate CFS-SL GP 16" and 24" 4 C-STD-033.3 Communications (HILTI) Cast-In-Place / Speed Sleeve F-A-3060 System Drawing 4 C-STD-034 Communications (HILTI) Cast-In-Place / Speed Sleeve Spacing 4 C-STD-035 Communications Intra Building Fiber Backbone Details 4 C-STD-036 Communications UTP 24 Port Voice (TIE) Patch Panel 4 C-STD-037 Communications Horizontal Patch Panel 4 C-STD-038 Communications Fiber Slack Storage Unit 4 C-STD-039 Communications Media Converter Detail	C-STD-024	Communications Typical Faceplate Labeling	4					
C-STD-027 Communications Cable Support Details for 4000 & 6000 Wiremold Vertical Riser  C-STD-028 Communications Typical Connection Between Conduit and 4000/6000 Wiremold  C-STD-029 Future - Communications Fiber Panel Label  C-STD-030 Future  C-STD-031 Communications Panduit LDP-010 Series Non Metallic Details 4  C-STD-032 Communications Reverse Fiber Pair Positioning 4  C-STD-033.1 Communications Typical Fire Stopping Details 4  C-STD-033.2 Communications (HILTI) Speed Sleeve Ganging Plate CFS-SL GP 16" and 24"  C-STD-033.3 Communications (HILTI) Cast-In-Place / Speed Sleeve F-A-3060 System Drawing 4  C-STD-034 Communications (HILTI) Cast-In-Place / Speed Sleeve Spacing 4  C-STD-035 Communications Intra Building Fiber Backbone Details 4  C-STD-036 Communications UTP 24 Port Voice (TIE) Patch Panel 4  C-STD-038 Communications Fiber Slack Storage Unit 4  C-STD-039 Communications Media Converter Detail 4	C-STD-025	Future						
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C-STD-030 Future C-STD-031 Communications Panduit LDP-010 Series Non Metallic Details 4 C-STD-032 Communications Reverse Fiber Pair Positioning 4 C-STD-033.1 Communications Typical Fire Stopping Details 4 C-STD-033.2 Communications (HILTI) Speed Sleeve Ganging Plate CFS-SL GP 16" and 24" 4 C-STD-033.3 Communications (HILTI) Cast-In-Place / Speed Sleeve F-A-3060 System Drawing 4 C-STD-033.4 Communications (HILTI) Cast-In-Place / Speed Sleeve Spacing 4 C-STD-034 Communications Intra Building Fiber Backbone Details 4 C-STD-035 Communications Intra Building Voice Riser Multi-Pair Cable Details 4 C-STD-036 Communications UTP 24 Port Voice (TIE) Patch Panel 4 C-STD-037 Communications Horizontal Patch Panel 4 C-STD-038 Communications Fiber Slack Storage Unit 4 C-STD-039 Communications Media Converter Detail 4	C-STD-028		4					
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C-STD-033.2 Communications (HILTI) Speed Sleeve Ganging Plate CFS-SL GP 16" and 24"  C-STD-033.3 Communications (HILTI) Cast-In-Place / Speed Sleeve F-A-3060 System Drawing  C-STD-033.4 Communications (HILTI) Cast-In-Place / Speed Sleeve Spacing 4  C-STD-034 Communications Intra Building Fiber Backbone Details 4  C-STD-035 Communications Intra Building Voice Riser Multi-Pair Cable Details 4  C-STD-036 Communications UTP 24 Port Voice (TIE) Patch Panel 4  C-STD-037 Communications Horizontal Patch Panel 4  C-STD-038 Communications Fiber Slack Storage Unit 4  C-STD-039 Communications Media Converter Detail 4	C-STD-032	Communications Reverse Fiber Pair Positioning	4					
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C-STD-036 Communications UTP 24 Port Voice (TIE) Patch Panel 4 C-STD-037 Communications Horizontal Patch Panel 4 C-STD-038 Communications Fiber Slack Storage Unit 4 C-STD-039 Communications Media Converter Detail 4	C-STD-034	Communications Intra Building Fiber Backbone Details	4					
C-STD-036Communications UTP 24 Port Voice (TIE) Patch Panel4C-STD-037Communications Horizontal Patch Panel4C-STD-038Communications Fiber Slack Storage Unit4C-STD-039Communications Media Converter Detail4	C-STD-035	Communications Intra Building Voice Riser Multi-Pair Cable Details	4					
C-STD-038 Communications Fiber Slack Storage Unit 4 C-STD-039 Communications Media Converter Detail 4	C-STD-036	Communications UTP 24 Port Voice (TIE) Patch Panel	4					
C-STD-038       Communications Fiber Slack Storage Unit       4         C-STD-039       Communications Media Converter Detail       4	C-STD-037							
C-STD-039 Communications Media Converter Detail 4	C-STD-038	Communications Fiber Slack Storage Unit						
C-STD-040 CT Trailer Fiber Umbilical Cord Option 1 4	C-STD-039							
	C-STD-040	CT Trailer Fiber Umbilical Cord Option 1	4					

Drawing No.	Drawing Title	Rev.
C-STD-041	CT Trailer Fiber Umbilical Cord Option 2	4
C-STD-042	Hospital Boom Connection Detail	4

## Appendix A - PHSA Communications Standard Sample Database

- .1 HorizontaL Cable Information
- .2 Intra-building UTP Riser Cable Information
- .3 Inter-building UTP Riser Cable Information
- .4 Intra-building Fiber Riser Cable Information
- .5 Inter-building Fiber Riser Cable Information

NEW CONDUIT (SIZE AS SHOWN ON DRAWING) NEW RACEWAY (SIZE AS SHOWN ON DRAWING) HORIZONTAL SLEEVE 0 VERTICAL SLEEVE EXISTING CONDUIT (SIZE AS SHOWN ON DRAWING) Z Z / ZEXISTING RACEWAY (SIZE AS SHOWN ON DRAWING) Р PULLBOX (SIZE AS SHOWN ON DRAWING)  $\left( \mathsf{J}\right)$ JUNCTION PULLBOX FLOOR MOUNT DUPLEX RECEPTACLE  $\bigoplus$ DUPLEX RECEPTACLE 5-20R  $\bigoplus$ 4-PLEX RECEPTACLE 5-20R IJ CEILING J-HOOKS WM **WIREMOLD** (T)TERMINATION LOCATION CR CARD READER

## NOTE:

1. STANDARD OUTLETS LOCATED IN SURFACE RACEWAY OR MODULAR FURNITURE SHALL BE SHOWN ON THE DRAWINGS WITH ONE SINGLE SYMBOL.

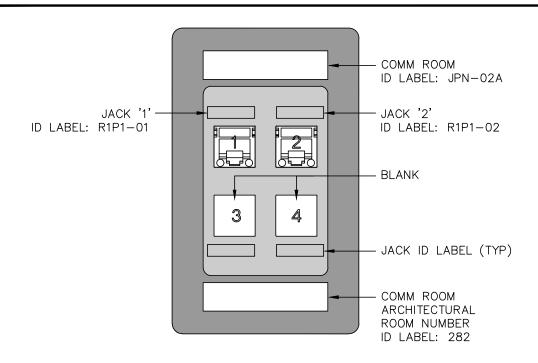
							Building/Facility Name
No.	BY	DATE		REVISION	NS	App'd	
Scale					BY	DATE	COMMUNICATION PATHWAYS
Sheet	Sheet No.		Drawn	СТ	08 02 22		
			Check'd	EG/NM	08 02 22	POWER/SECURITY OUTLETS	
Projec	t No.			Design'd	NM/EG	08 02 22	DRAWING SYMBOLS
				Approv'd	SL	08 02 22	DRAWING STWIDGES
15		Provin Servic	icial Health es Authority	and are for th	nd it's contents are e private information e relied upon or used	of the	PROVINCIAL HEALTH SERVICES AUTHORITY (PHSA)
8	Services Authority Province-wide solutions. Better health.  It is not to be relied upon or used in whole or in part for other purposes or by or for the benefit of others without prior adaptation and specific written verification by PHSA						C-STD-001.0 Rev. 4

HORIZONTAL CABLES - # DENOTES NUMBER OF DROPS 2x HORIZONTAL CABLES - WALL OUTLET Ŵ. EXISTING 2x HORIZONTAL CABLES - WALL MOUNTED OUTLET  $\langle \mathbf{V} \rangle$ 2x HORIZONTAL CABLES - FURNITURE OUTLET ⟨**Ţ**Ţ⟩ EXISTING 2x HORIZONTAL CABLES - FURNITURE OUTLET  $|\nabla|$ 2x HORIZONTAL CABLES - FLOOR OUTLET  $\nabla$ EXISTING 2x HORIZONTAL CABLES - FLOOR MOUNTED DATA OUTLET NEW 1x HORIZONTAL CABLE - WALL MOUNTED TELEPHONE PVEXISTING 1x HORIZONTAL CABLE - WALL MOUNTED TELEPHONE  $\mathbb{V}_{\Box}$ 2x HORIZONTAL CABLES - CEILING MOUNTED DATA OUTLET  $\mathbf{V}$ WIRELESS ACCESS POINT CEILING OUTLET AΡ c/w 2x HORIZONTAL CABLES CAMERA: 1x HORIZONTAL CABLE - CEILING OUTLET CR CARD READER DIV.27 TO INCLUDE FOR THE INSTALLATION OF A HEALTHCARE PROVIDED ACCESS POINT AT THESE LOCATIONS AND PATCH IN THE DUAL PATCH CORDS

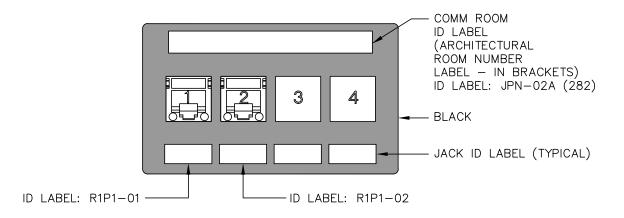
# NOTE:

- 1. THE SYMBOL FOR STANDARD OUTLETS INDICATES A COMBINATION VOICE-DATA OUTLET.
- 2. REFER TO SECTION 27 15 00 HORIZONTAL CABLING FOR UTP CATEGORY CAT.6 OR CAT.6A AS REQUIRED.

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		Check'd	EG/NM	08 02 22	VOICE—DATA OUTLET		
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4	Services Authority Province-wide solutions. Better health.					C-STD-001.1 Rev. 4	



## EXAMPLE: 4-PORT WALL PLATE

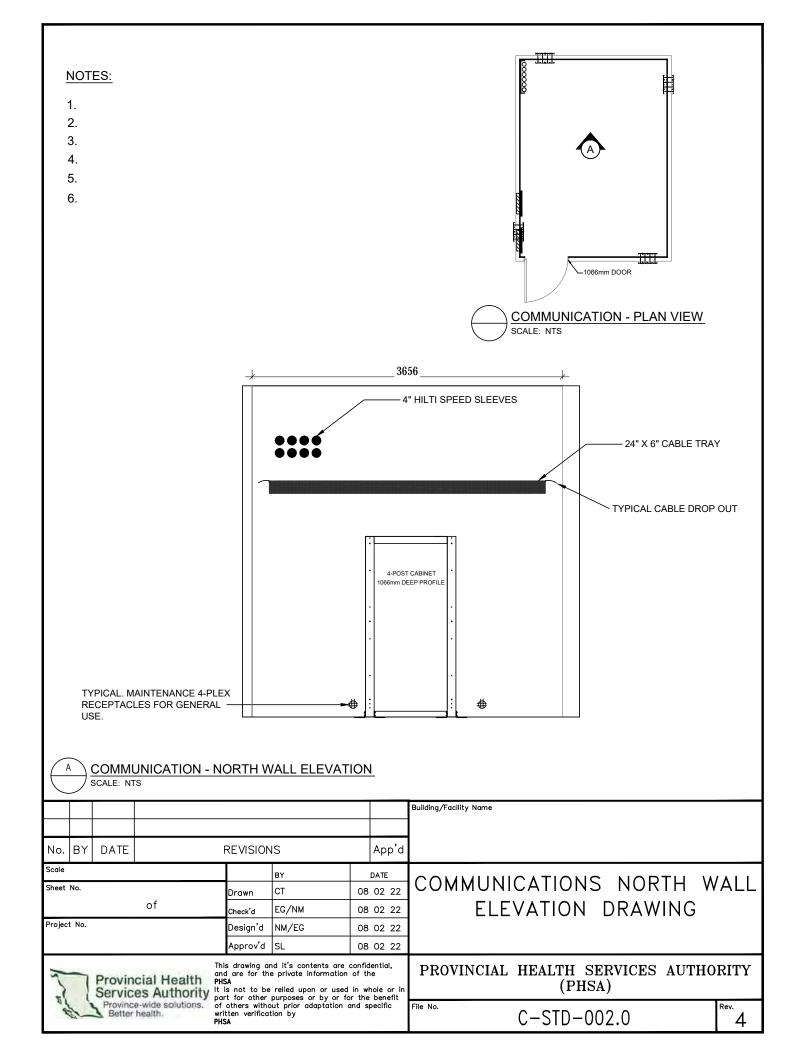


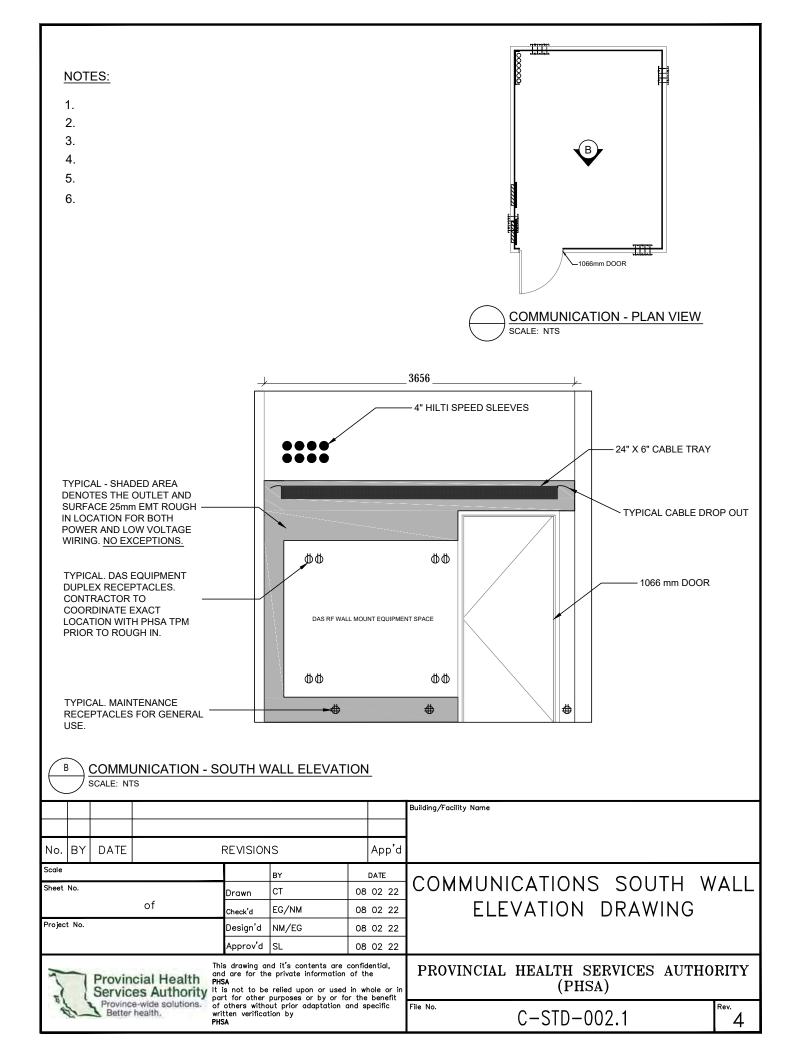
# EXAMPLE: 4-PORT FURNITURE PLATE

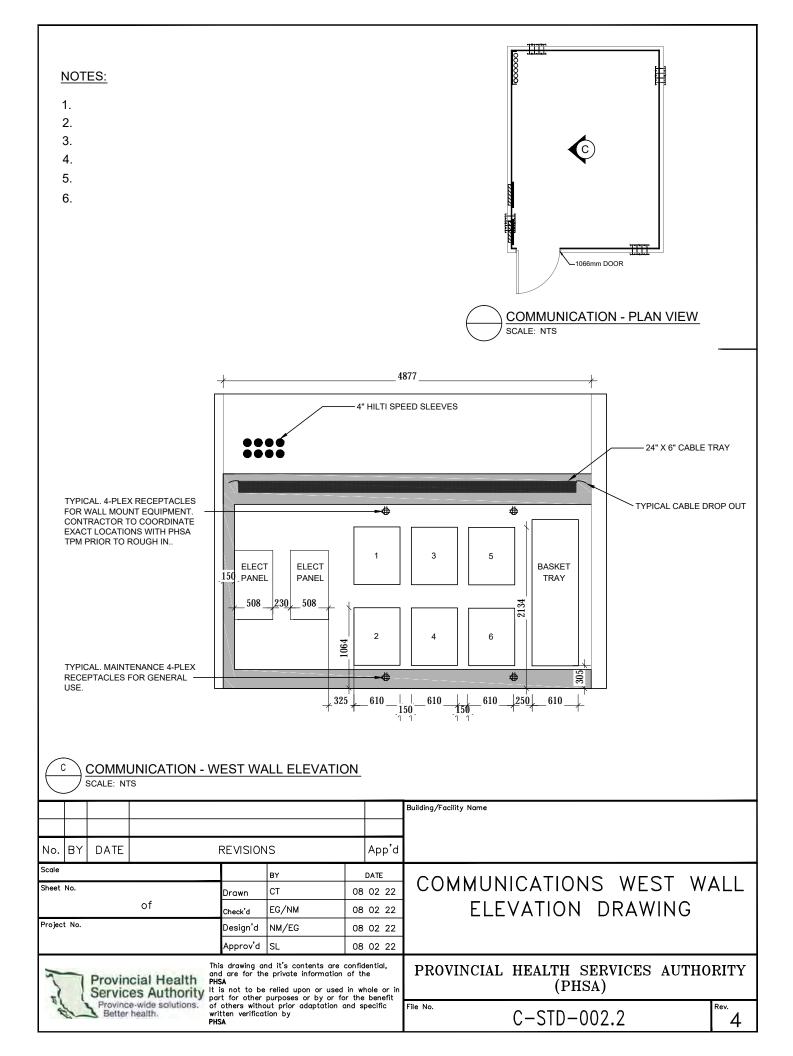
2 2 NEW HORIZONTAL JACKS

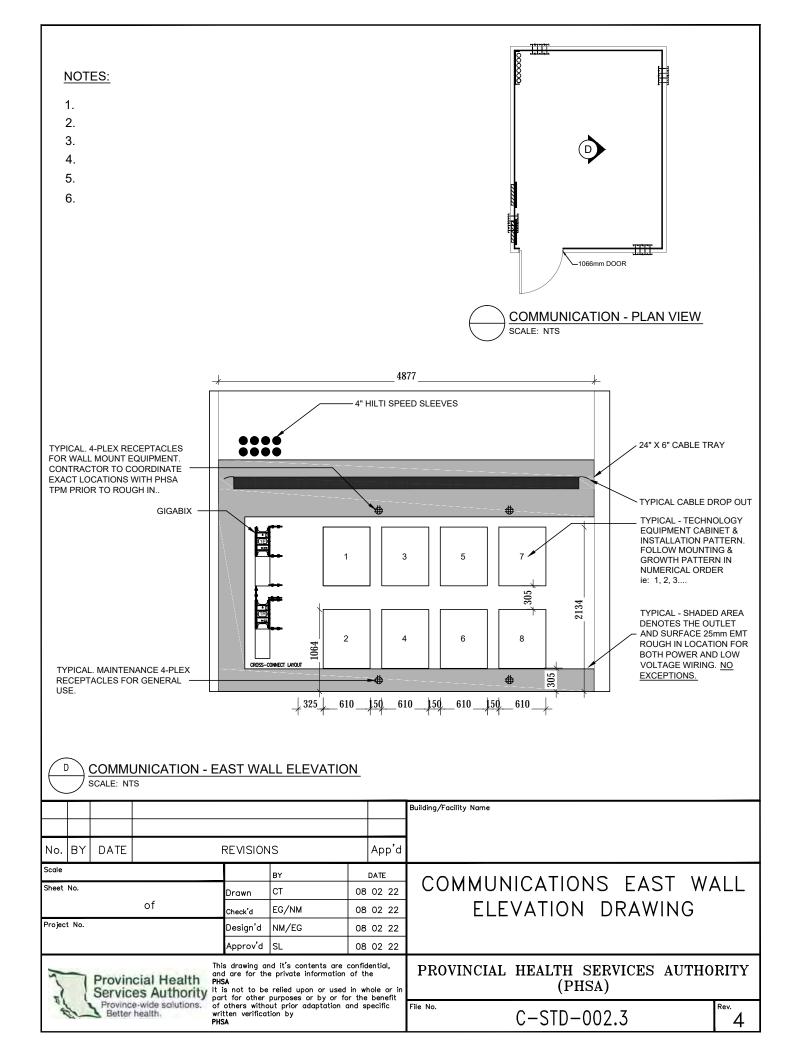
NOTE: WALL MOUNT PHONE WITH 1 JACK

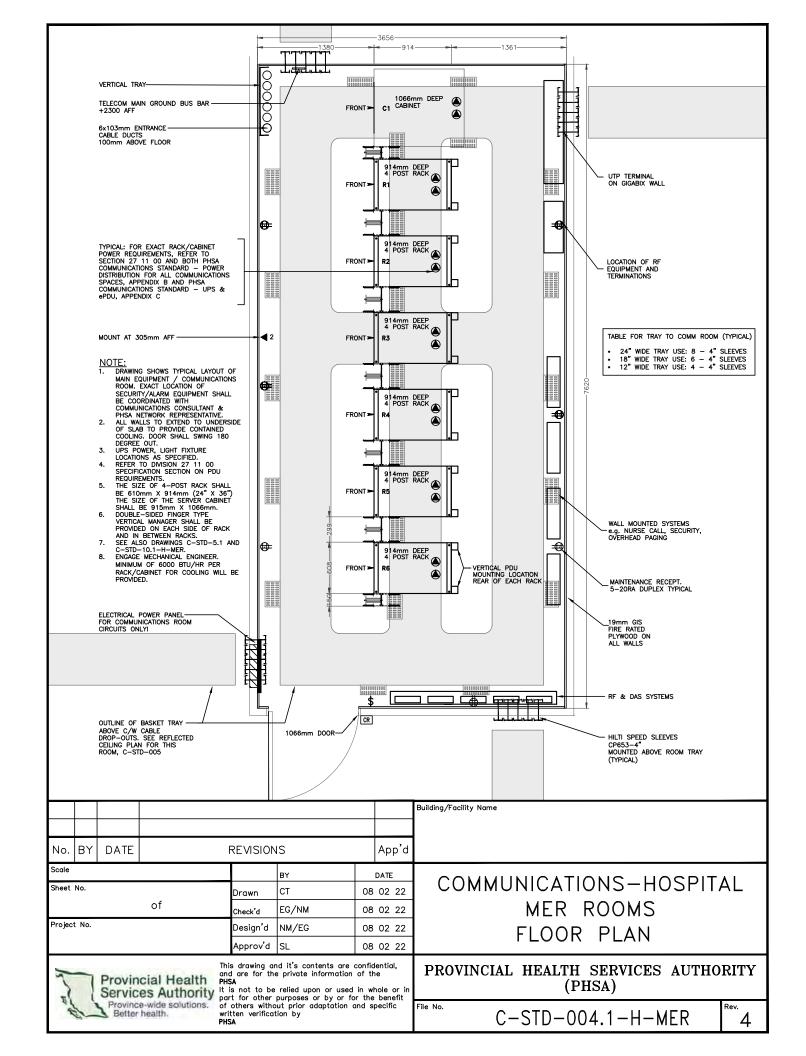
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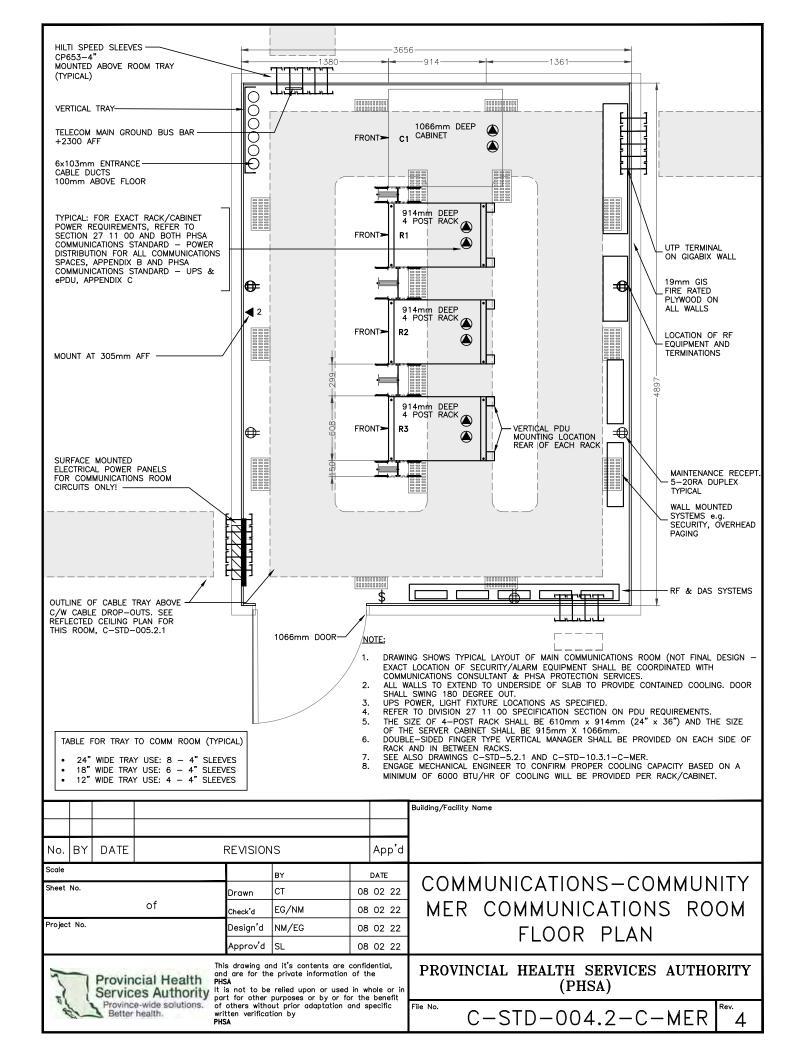


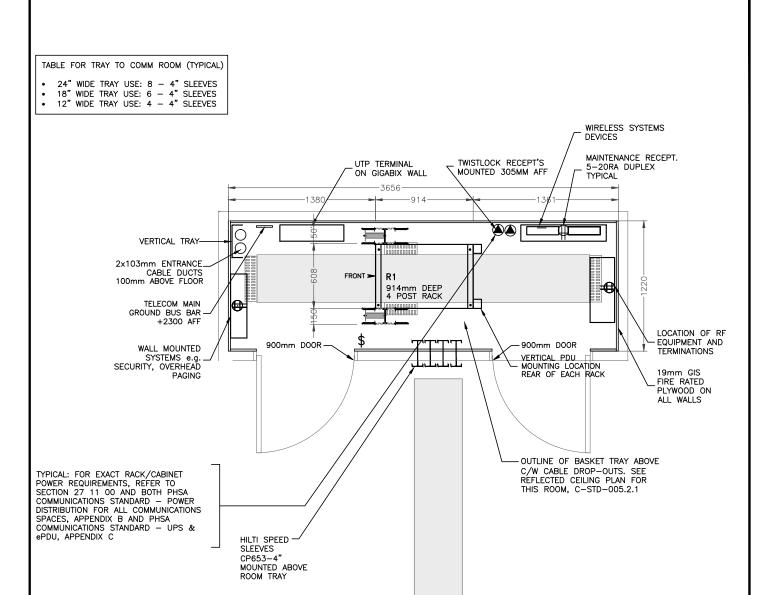








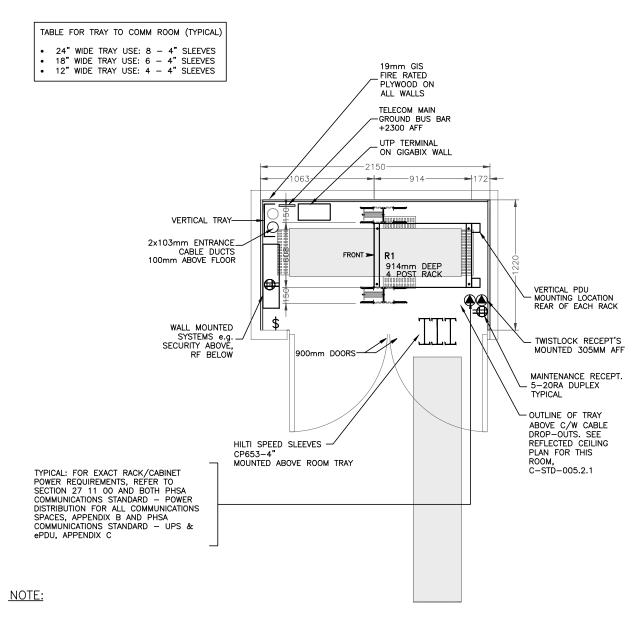




## NOTE:

- 1. DRAWING SHOWS TYPICAL LAYOUT OF COMMERCIAL LARGE COMMUNICATIONS CLOSET (NOT FINAL DESIGN SERVES FLOOR AREA OF 500m2 (5,000ft2)).
- 2. EXACT LOCATION OF SECURITY/ALARM EQUIPMENT SHALL BE COORDINATED WITH COMMUNICATIONS CONSULTANT & PHSA PROTECTION SERVICES.
- 3. ALL WALLS TO EXTEND TO UNDERSIDE OF SLAB TO PROVIDE CONTAINED COOLING. DOORS SHALL SWING 180 DEGREE OUT.
- 4. UPS POWER, LIGHT FIXTURE LOCATIONS AS SPECIFIED.
- 5. REFER TO DIVISION 27 11 00 SPECIFICATION SECTION ON PDU REQUIREMENTS.
- 6. THE SIZE OF 4-POST RACK SHALL BE 610mm x 914mm (24" x 36").
- 7. DOUBLE-SIDED FINGER TYPE VERTICAL MANAGER SHALL BE PROVIDED ON EACH SIDE OF RACK.
- 8. SEE ALSO DRAWINGS C-STD-5.3 AND C-STD-10.5-C-LCC.
- 9. ENGAGE MECHANICAL ENGINEER TO CONFIRM PROPER COOLING CAPACITY BASED ON A MINIMUM OF 6000 BTU/HR OF COOLING WILL BE PROVIDED PER RACK/CABINET. NOTE: MINIMUM HVAC IN A TR IS 1 TON.

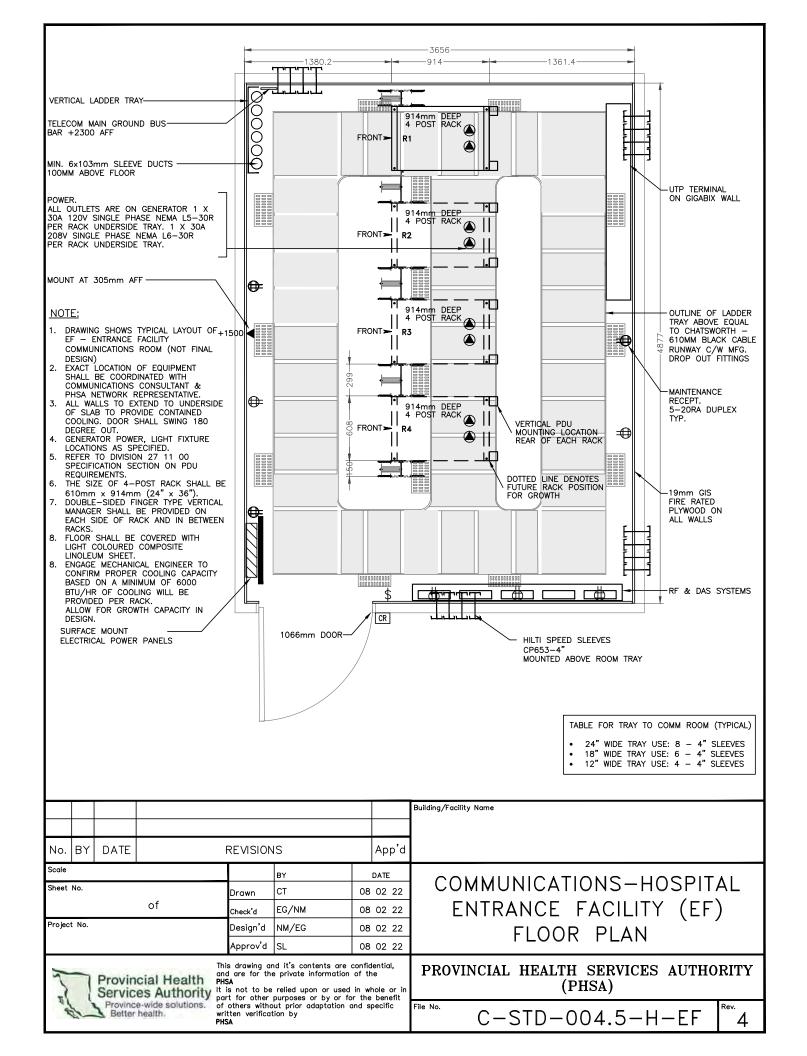
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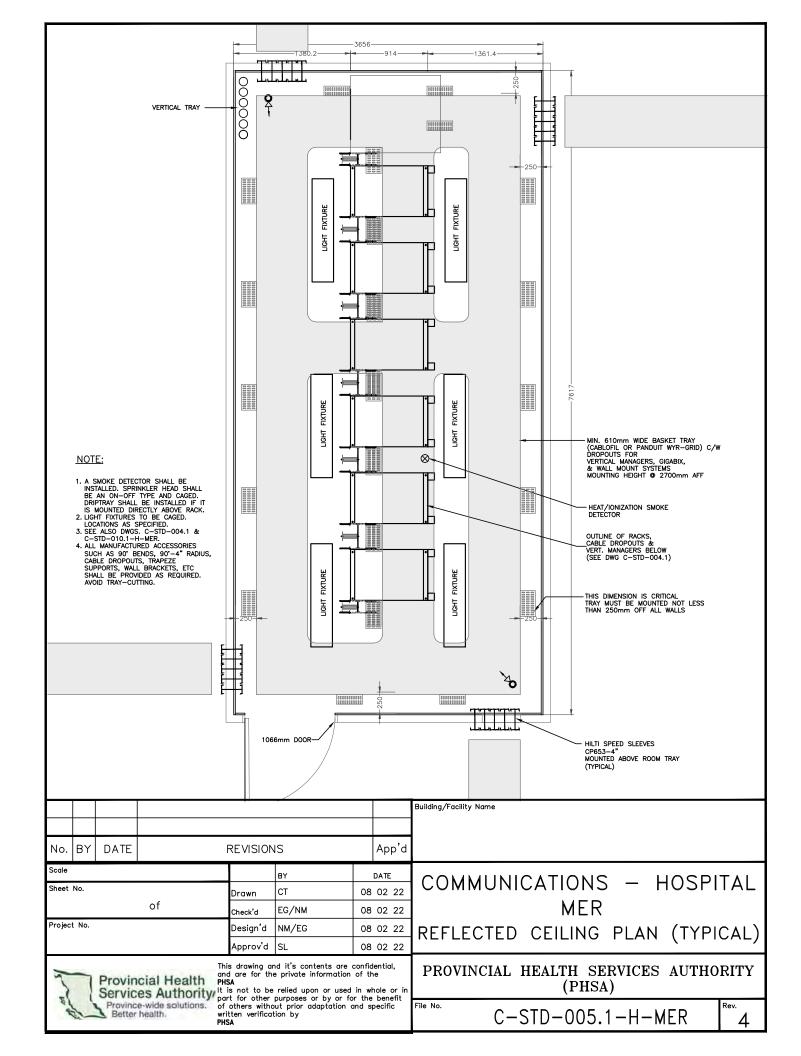


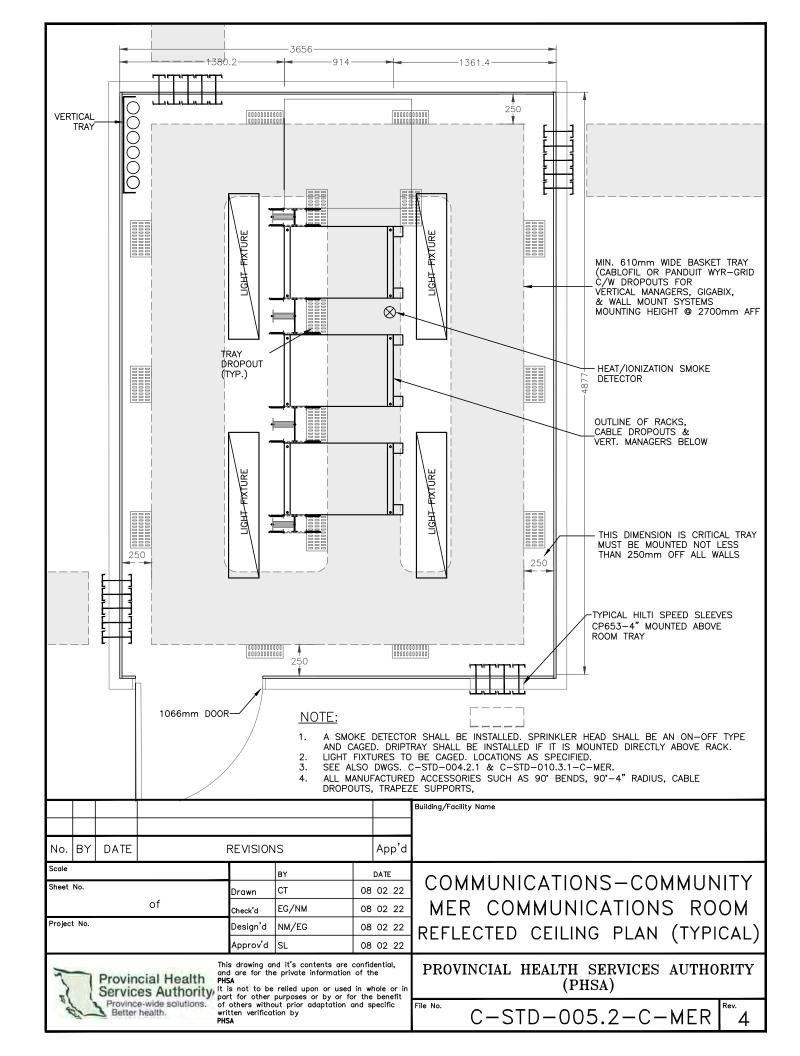
- 1. DRAWING SHOWS TYPICAL LAYOUT OF COMMERCIAL SMALL COMMUNICATIONS CLOSET (NOT FINAL DESIGN SERVES FLOOR AREA OF 100m2 (1,000ft2).
- 2. EXACT LOCATION OF SECURITY/ALARM EQUIPMENT SHALL BE COORDINATED WITH COMMUNICATIONS CONSULTANT & PHSA PROTECTION SERVICES. 3. ALL WALLS TO EXTEND TO UNDERSIDE OF SLAB TO PROVIDE CONTAINED COOLING. DOORS SHALL SWING 180 DEGREE OUT.
- 4. UPS POWER, LIGHT FIXTURE LOCATIONS AS SPECIFIED.
- 5. REFER TO DIVISION 27 11 00 SPECIFICATION SECTION ON PDU REQUIREMENTS.
- 6. THE SIZE OF 4-POST RACK SHALL BE 610mm x 914mm (24" x 36").

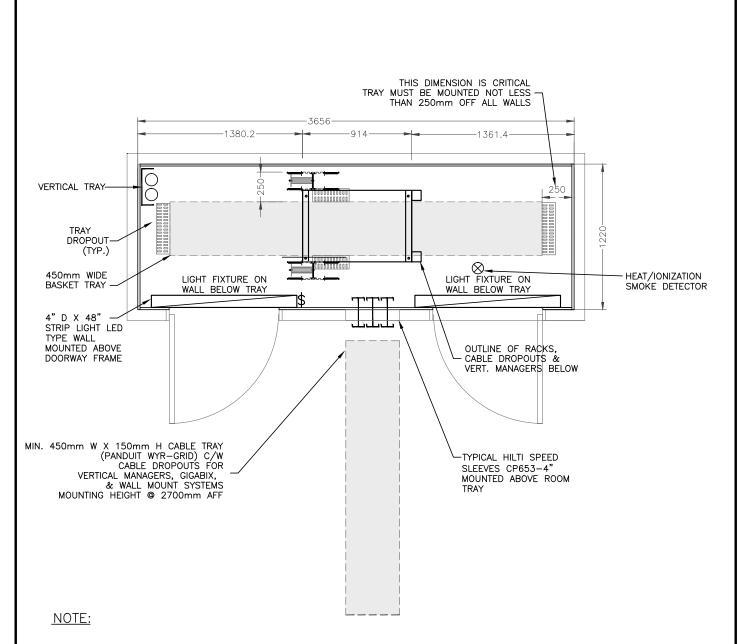
- 7. DOUBLE-SIDED FINGER TYPE VERTICAL MANAGER SHALL BE PROVIDED ON EACH SIDE OF RACK.
- 8. SEE ALSO DRAWINGS C-STD-5.4 AND C-STD-10.6-C-SCC.
- 9. ENGAGE MECHANICAL ENGINEER TO CONFIRM PROPER COOLING CAPACITY BASED ON A MINIMUM OF 6000 BTU/HR OF COOLING WILL BE PROVIDED PER RACK. ALLOW FOR SPARE CAPACITY IN DESIGN. NOTE: MINIMUM HVAC IN A TR IS 1 TON.

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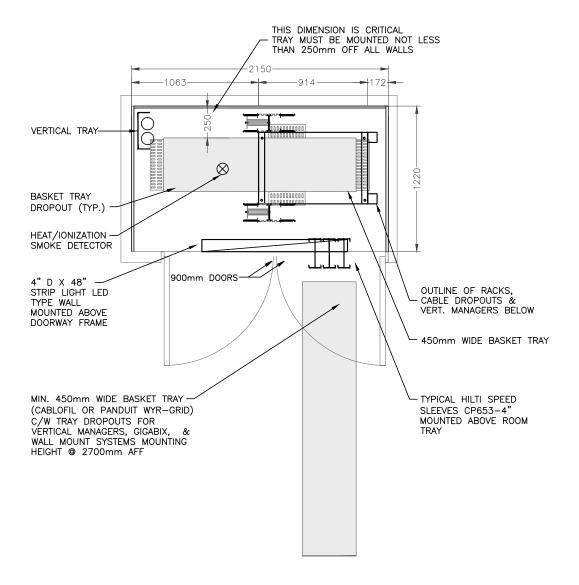






- A SMOKE DETECTOR SHALL BE INSTALLED. SPRINKLER HEAD SHALL BE AN ON-OFF TYPE AND CAGED. DRIPTRAY SHALL BE INSTALLED IF IT IS MOUNTED DIRECTLY ABOVE RACK.
- 2. LIGHT FIXTURES TO BE CAGED. LOCATIONS AS SPECIFIED.
- 3. SEE ALSO DWGS. C-STD-004.3 & C-STD-010.5-C-LTC.
- 4. ALL MANUFACTURED ACCESSORIES SUCH AS 90° BENDS, 90°-4" RADIUS, CABLE DROPOUTS, TRAPEZE SUPPORTS, WALL BRACKETS, ETC SHALL BE PROVIDED AS REQUIRED. AVOID TRAY—CUTTING.

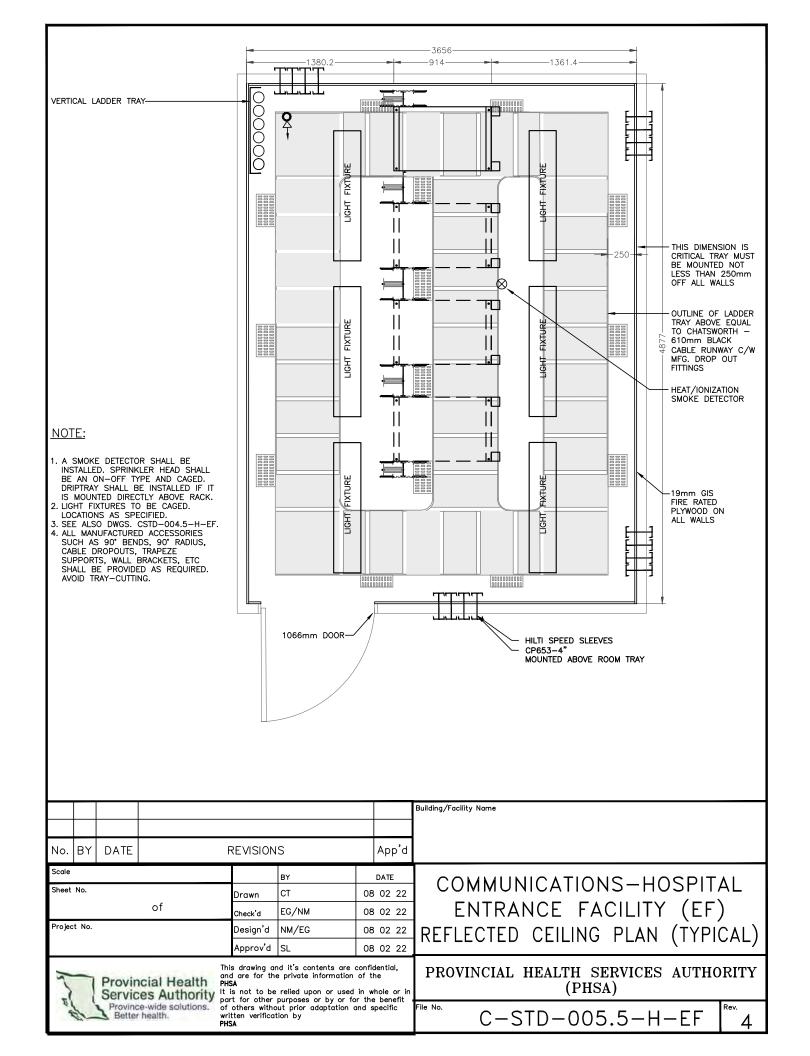
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4							File No. C-STD-005.3-C-LCC Rev. 4

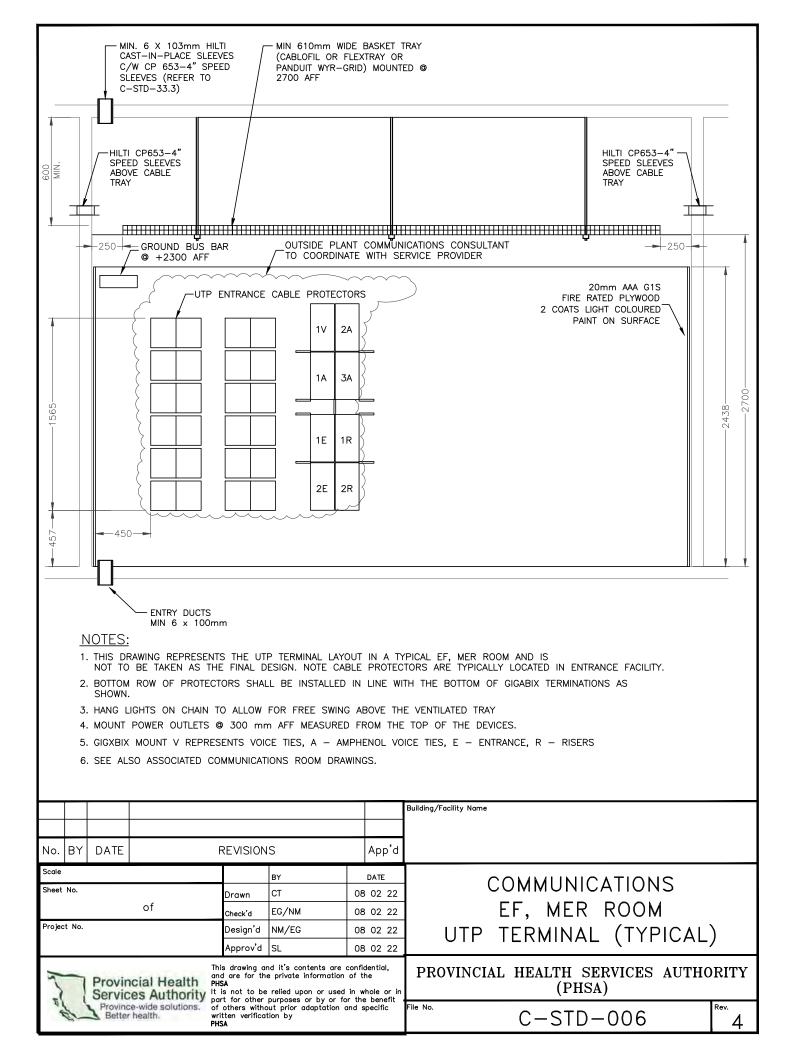


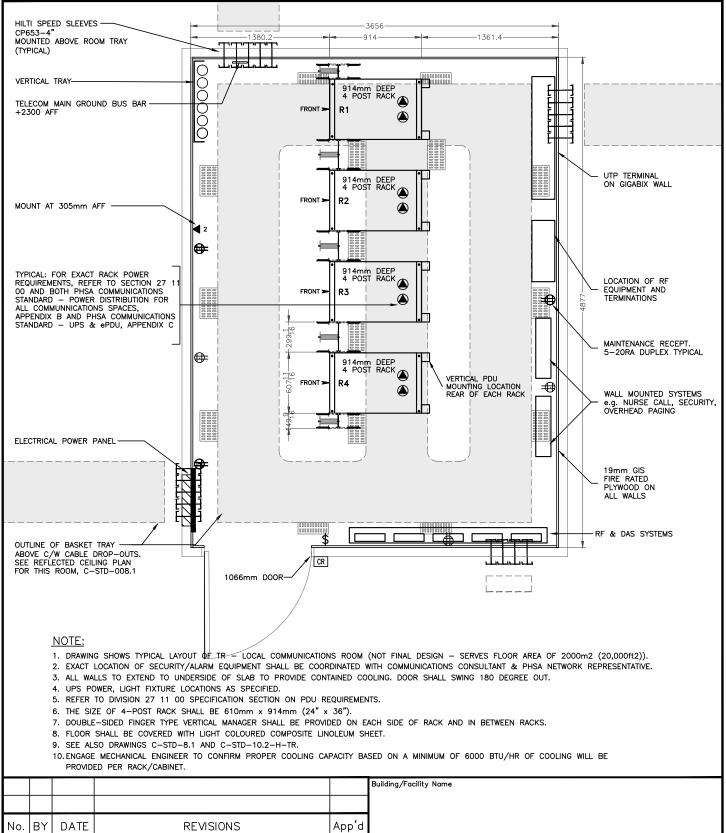
# NOTE:

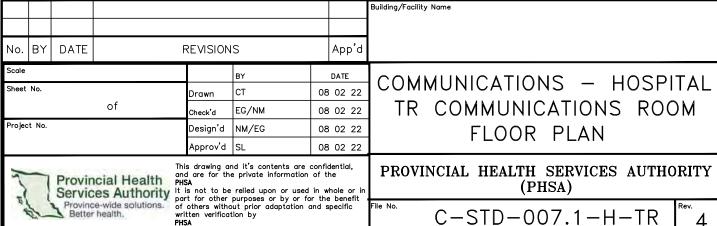
- 1. A SMOKE DETECTOR SHALL BE INSTALLED. SPRINKLER HEAD SHALL BE AN ON-OFF TYPE AND CAGED. DRIPTRAY SHALL BE INSTALLED IF IT IS MOUNTED DIRECTLY ABOVE RACK.
- 2. LIGHT FIXTURES TO BE CAGED. LOCATIONS AS SPECIFIED.
- 3. SEE ALSO DWGS. C-STD-004.4 & C-STD-010.6-C-SCC.
- 4. ALL MANUFACTURED ACCESSORIES SUCH AS 90° BENDS, 90°-4" RADIUS, CABLE DROPOUTS, TRAPEZE SUPPORTS, WALL BRACKETS, ETC SHALL BE PROVIDED AS REQUIRED. AVOID TRAY—CUTTING.

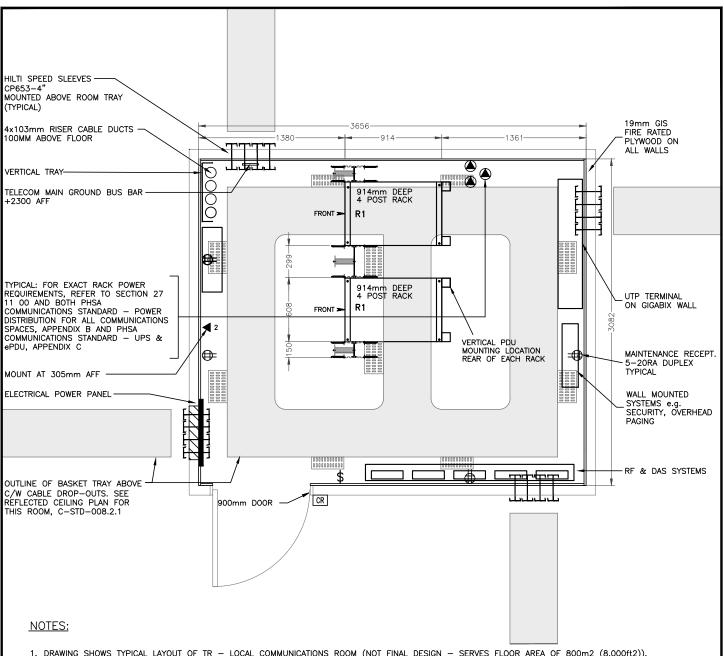
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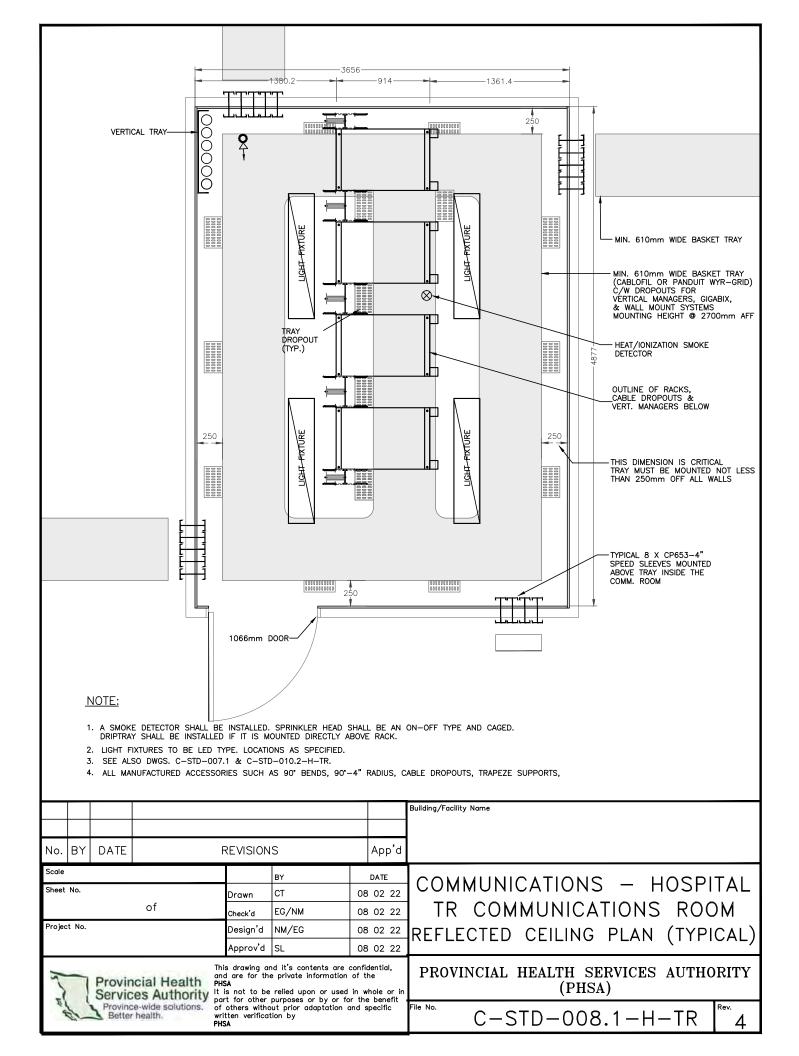


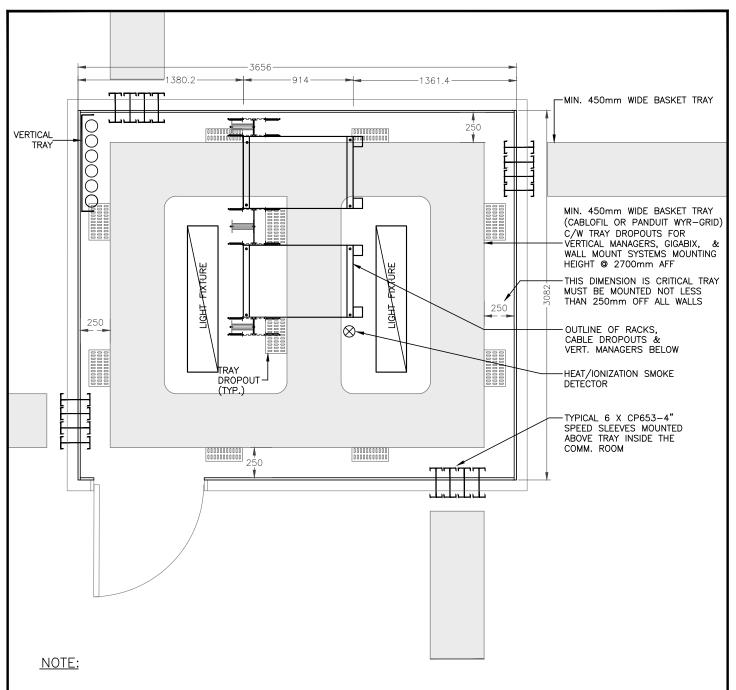




- 1. DRAWING SHOWS TYPICAL LAYOUT OF TR LOCAL COMMUNICATIONS ROOM (NOT FINAL DESIGN SERVES FLOOR AREA OF 800m2 (8,000ft2)).
- 2. EXACT LOCATION OF SECURITY/ALARM EQUIPMENT SHALL BE COORDINATED WITH COMMUNICATIONS CONSULTANT & PHSA PROTECTION SERVICES.
- 3. ALL WALLS TO EXTEND TO UNDERSIDE OF SLAB TO PROVIDE CONTAINED COOLING. DOOR SHALL SWING 180 DEGREE OUT.
- 4. UPS POWER, LIGHT FIXTURE LOCATIONS AS SPECIFIED.
- 5. REFER TO DIVISION 27 11 00 SPECIFICATION SECTION ON PDU REQUIREMENTS.
- 6. THE SIZE OF 4-POST RACK SHALL BE 610mm x 914mm (24" x 36").
- 7. DOUBLE-SIDED FINGER TYPE VERTICAL MANAGER SHALL BE PROVIDED ON EACH SIDE OF RACK AND IN BETWEEN RACKS.
- 8. FLOOR SHALL BE COVERED WITH LIGHT COLOURED COMPOSITE LINOLEUM SHEET.
- 9. SEE ALSO DRAWINGS C-STD-008.2.1, C-STD-009 AND C-STD-010.4.1-C-TR TO C-STD-013.
- 10.ENGAGE MECHANICAL ENGINEER TO CONFIRM PROPER COOLING CAPACITY BASED ON A MINIMUM OF 6000 BTU/HR OF COOLING WILL BE PROVIDED PER RACK/CABINET. ALLOW FOR GROWTH CAPACITY IN DESIGN. NOTE: MINIMUM HVAC IN A TR IS 1 TON

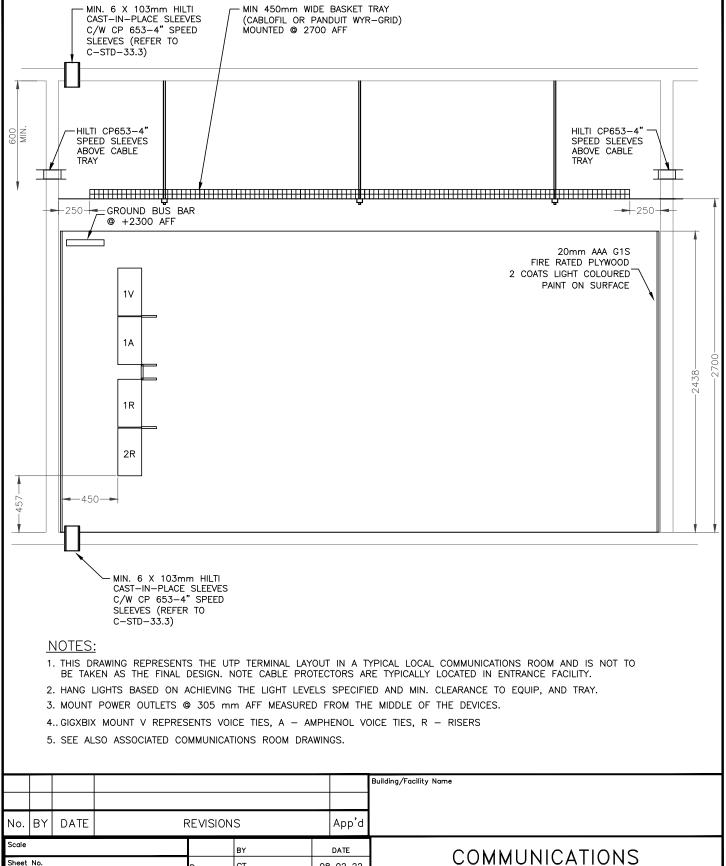
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This drawing and it's contents are confident of the private information of the PHSA  Services Authority It is not to be relied upon or used in what is not to be						ition of the used in whole or in	PROVINCIAL HEALTH SERVICES AUTHORITY (PHSA)
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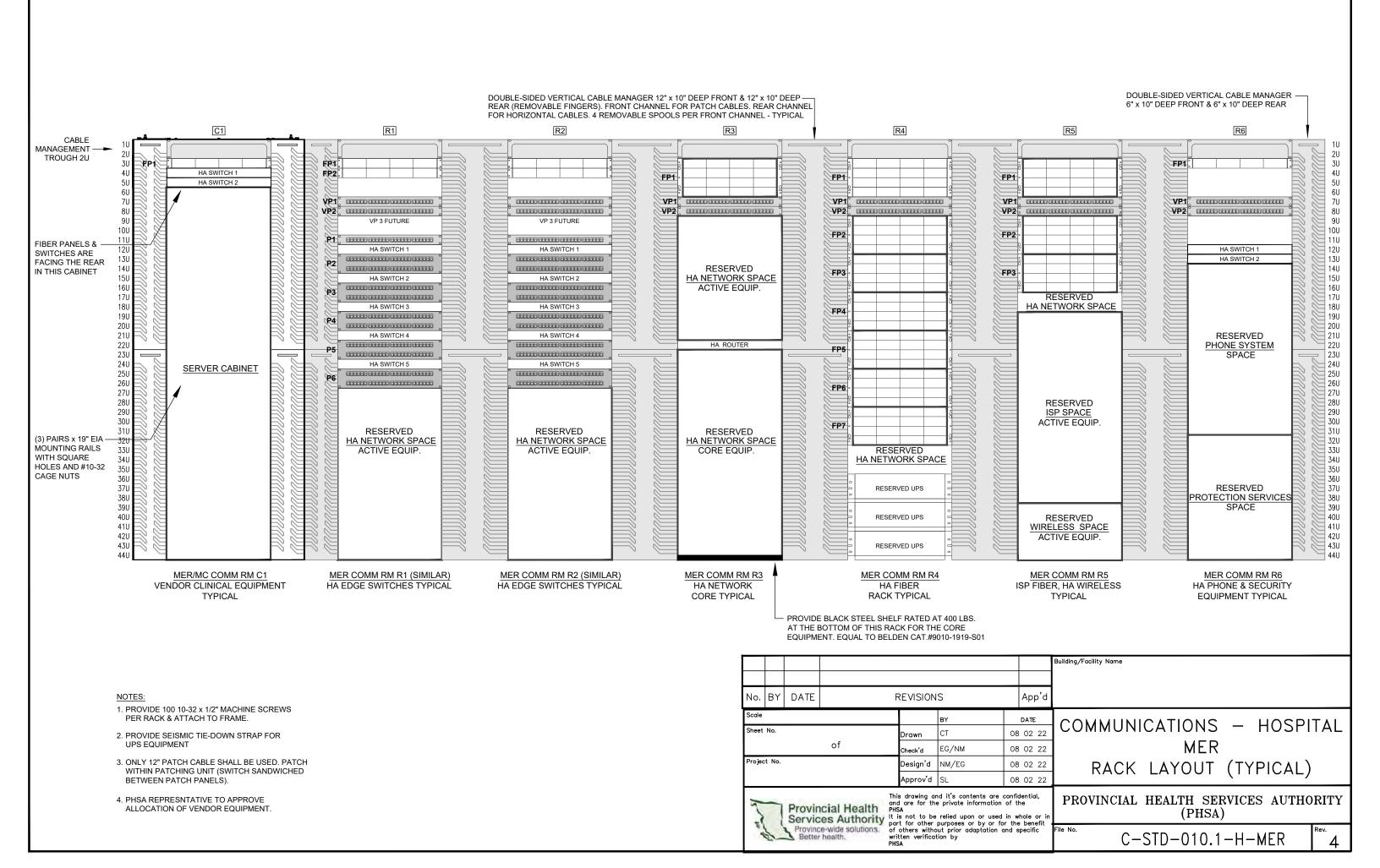


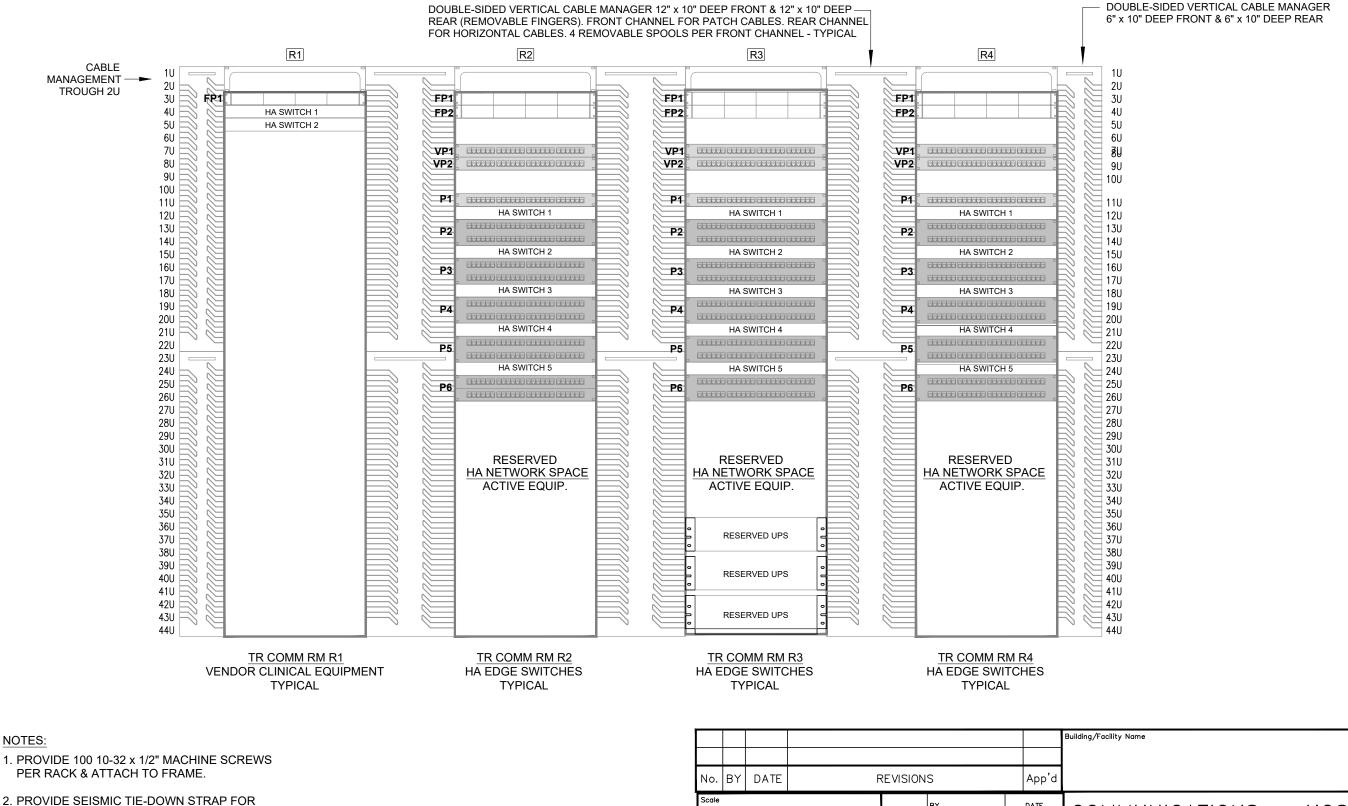
- 1. A SMOKE DETECTOR SHALL BE INSTALLED. SPRINKLER HEAD SHALL BE AN ON-OFF TYPE AND CAGED. DRIPTRAY SHALL BE INSTALLED IF IT IS MOUNTED DIRECTLY ABOVE RACK.
- 2. LIGHT FIXTURES TO BE LED TYPE. LOCATIONS AS SPECIFIED.
- 3. SEE ALSO DWGS. C-STD-007.2.1 & C-STD-010.4-C-TR.
- 4. ALL MANUFACTURED ACCESSORIES SUCH AS 90° BENDS, 90°-4" RADIUS, CABLE DROPOUTS, TRAPEZE SUPPORTS,

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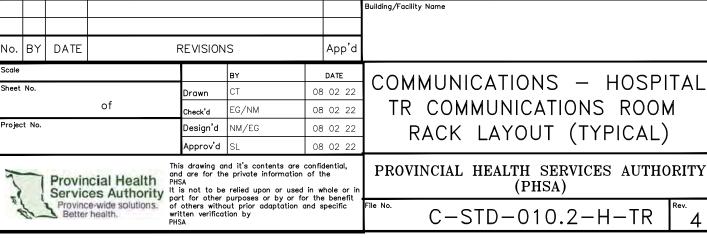
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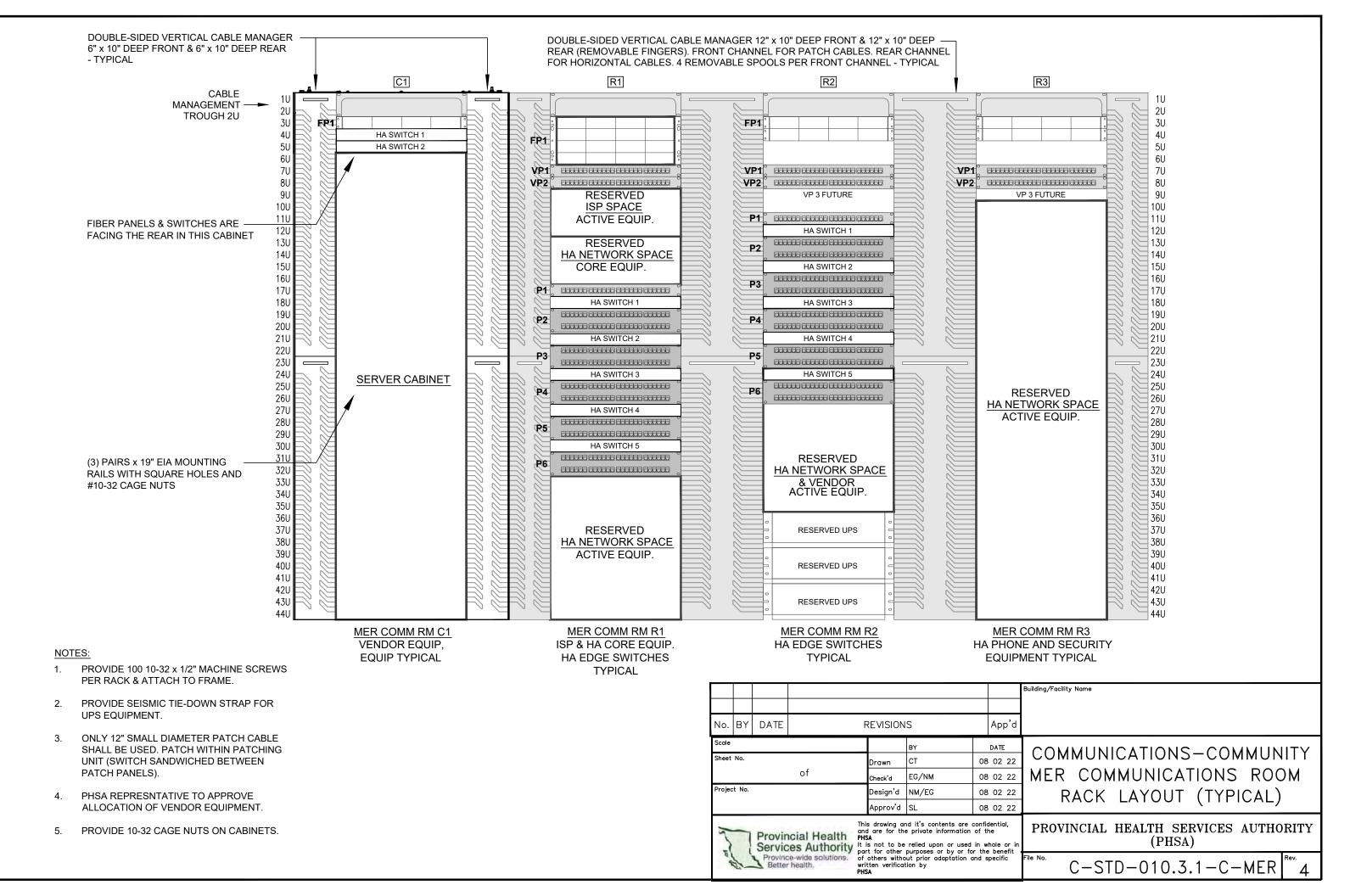


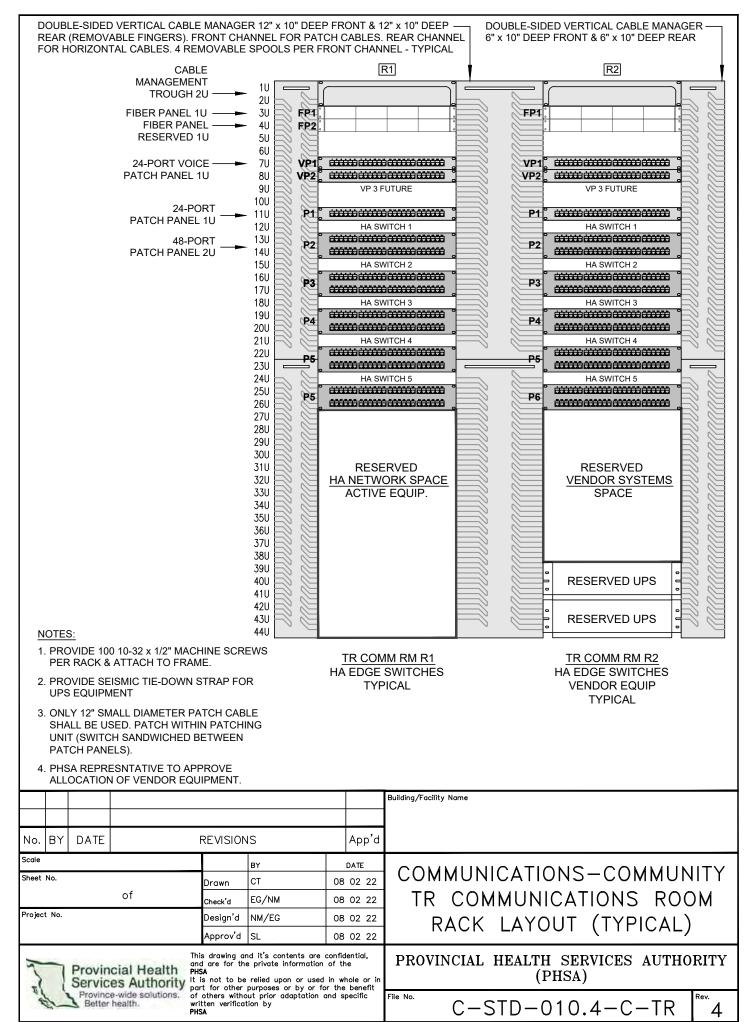


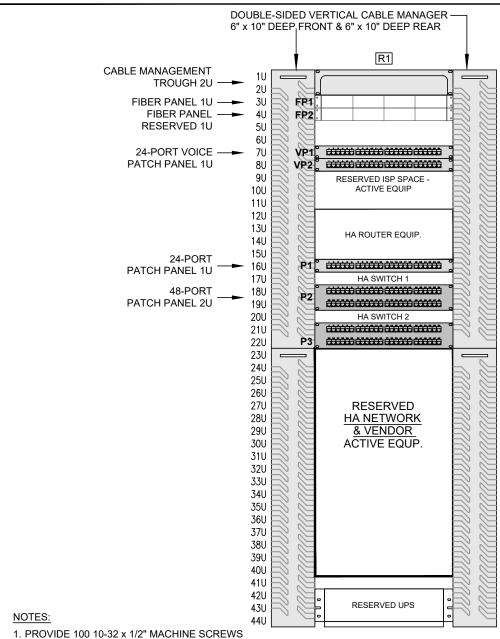
### NOTES:

- PER RACK & ATTACH TO FRAME.
- UPS EQUIPMENT
- 3. ONLY 12" PATCH CABLE SHALL BE USED. PATCH WITHIN PATCHING UNIT (SWITCH SANDWICHED BETWEEN PATCH PANELS).
- 4. PHSA REPRESNTATIVE TO APPROVE ALLOCATION OF VENDOR EQUIPMENT.









- PER RACK & ATTACH TO FRAME.
- 2. PROVIDE SEISMIC TIE-DOWN STRAP FOR **UPS EQUIPMENT**
- 3. ONLY 12" SMALL DIAMETER PATCH CABLE SHALL BE USED. PATCH WITHIN PATCHING UNIT (SWITCH SANDWICHED BETWEEN PATCH PANELS).
- 4. PHSA REPRESNTATIVE TO APPROVE ALLOCATION OF VENDOR EQUIPMENT.

LARGE COMM CLOSET R1 HA NETWORK & VENDOR EQUIP. **TYPICAL** 

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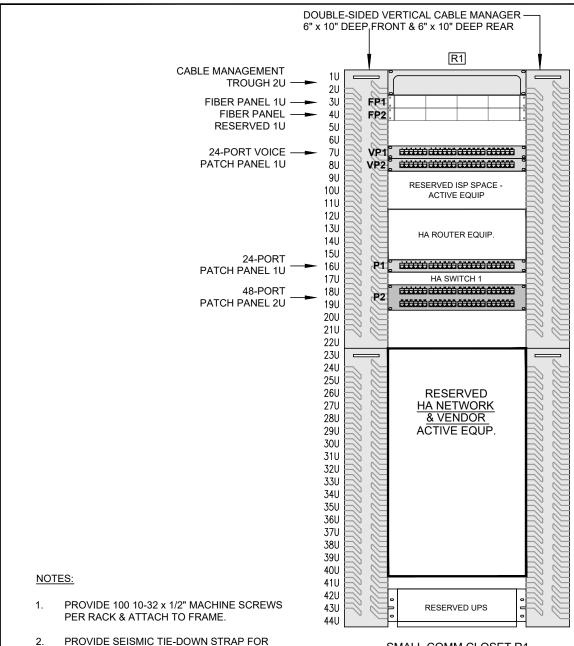
COMMUNICATIONS-COMMUNITY LARGE COMMUNICATIONS CLOSET RACK LAYOUT (TYPICAL)

Provincial Health Services Authority Province-wide solutions. Better health.

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PROVINCIAL HEALTH SERVICES AUTHORITY (PHSA)

File No. C-STD-010.5-C-LCC



SMALL COMM CLOSET R1 HA NETWORK & VENDOR EQUIP. **TYPICAL** 

- 2. UPS EQUIPMENT.
- ONLY 12" SMALL DIAMETER PATCH CABLE SHALL BE USED. PATCH WITHIN PATCHING UNIT (SWITCH SANDWICHED BETWEEN PATCH PANELS).
- PHSA REPRESNITATIVE TO APPROVE ALLOCATION OF VENDOR EQUIPMENT.

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Provincial Health
Services Authority
Province-wide solutions.
Better health.

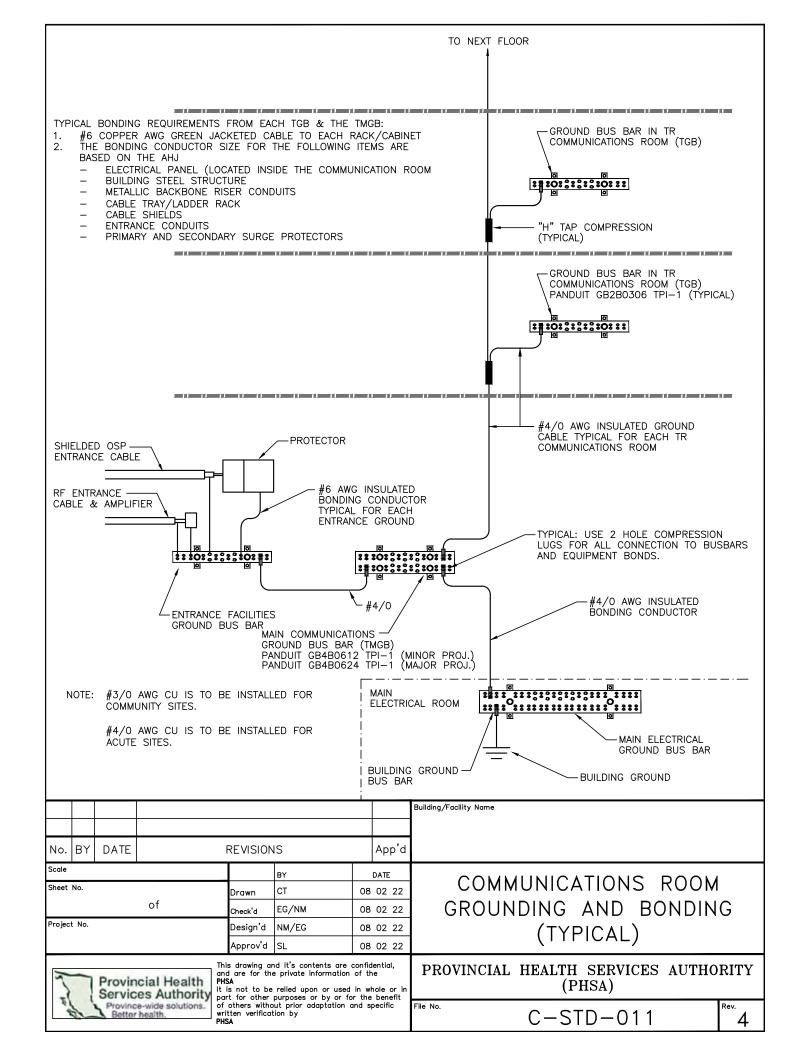
This drawing and it's contents are confidential, and are for the private information of the PHSA

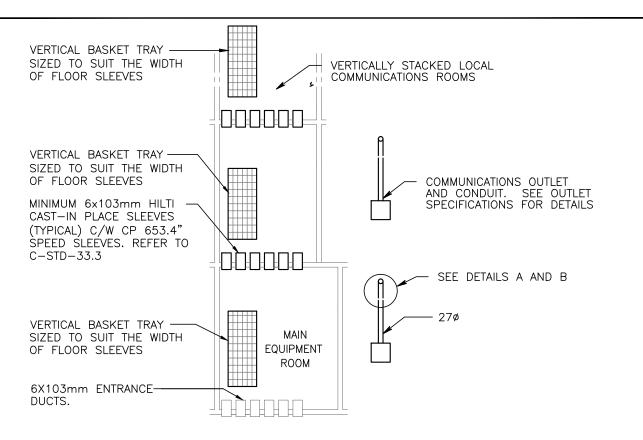
It is not to be relied upon or used in whole or in part for other purposes or by or for the benefit of others without prior adaptation and specific written verification by PHSA

COMMUNICATIONS-COMMUNITY SMALL COMMUNICATIONS CLOSET RACK LAYOUT (TYPICAL)

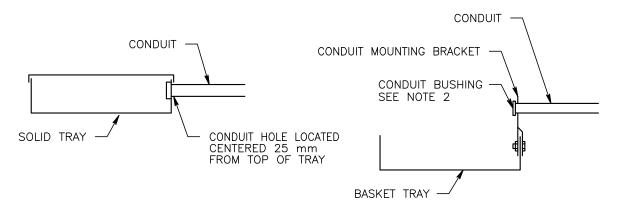
PROVINCIAL HEALTH SERVICES AUTHORITY (PHSA)

File No. C-STD-010.6-C-SCC





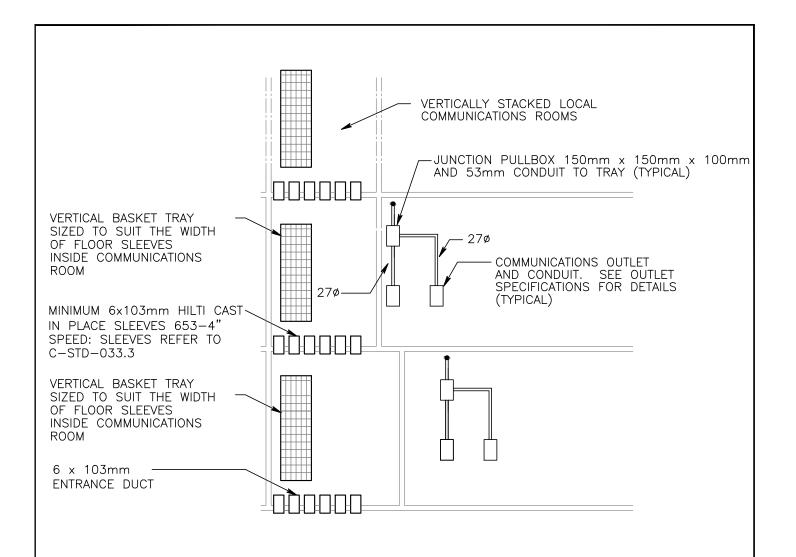
### TYPICAL RISER DIAGRAM



<u>DETAIL A — CONDUIT TO SOLID TRAY</u> <u>NOTES:</u> DETAIL B - CONDUIT TO BASKET TRAY

- 1. FOR RESIDENTIAL BUILDINGS CONSULT C-STD-013.
- 2. IF CONDUIT MOUNTING BRACKET IS NOT USED ON BASKET TRAY, USE GROUNDING BUSHING TO GROUND CONDUIT WITH A #12 AWG WIRE TO THE TRAY.
- 3. FOR FLOOR SLEEVE COUNT REFER TO SPECIFICATIONS TO DETERMINE THE CORRECT COUNT.

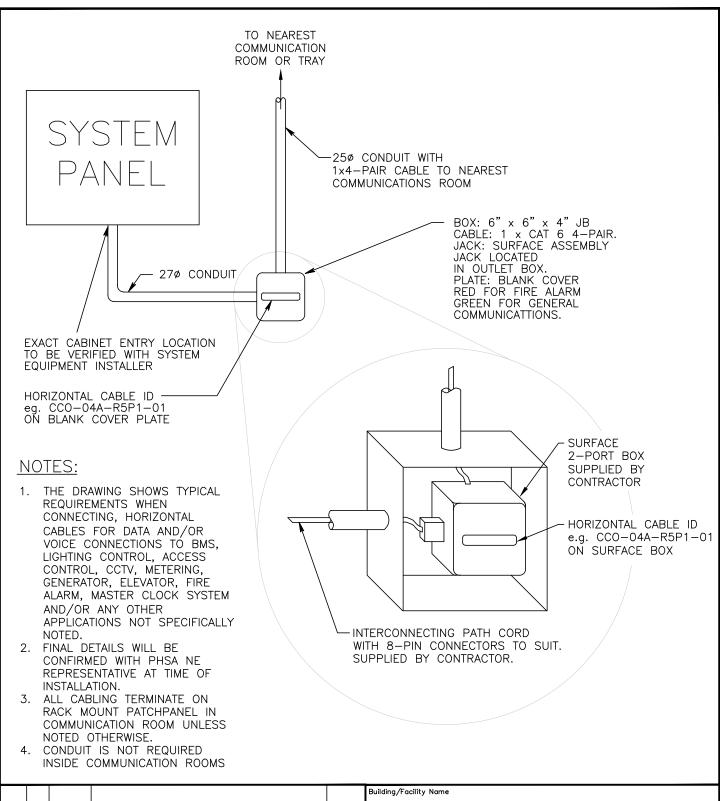
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4	Province-wide solutions.  Better health.  Better health.  Better health.  Better health.							File No. C-STD-012 Rev. 4



### NOTES:

- 1. MINIMUM CONDUIT SIZE SHALL BE 270. IF A LARGER NUMBER OF OUTLETS HAS TO BE INSTALLED IN THE SAME AREA, A MINIMUM 530 FEEDER CONDUIT SHALL BE USED AS A "ZONE CONDUIT" FOR EACH AREA. THE CONDUIT SHALL TERMINATE IN A LARGE PULL—BOX INSIDE THE AREA WHICH SHALL BE THE CONDUIT DISTRIBUTION POINT FOR THAT AREA.
- 2. OUTLET BOX: DUAL GANG DEEP WITH SINGLE GANG MUDRING & DEVICE COVER. RUN 2x CATEGORY 6 OR 6A AS PER PROJECT REQUIREMENT VERIFIED 4—PAIR CABLE TO EACH OUTLET UNLESS OTHERWISE NOTED. SEE OUTLET SPECIFICATIONS.
- 3. FOR FLOOR SLEEVE COUNT REFER TO SPECIFICATIONS TO DETERMINE THE CORRECT COUNT.

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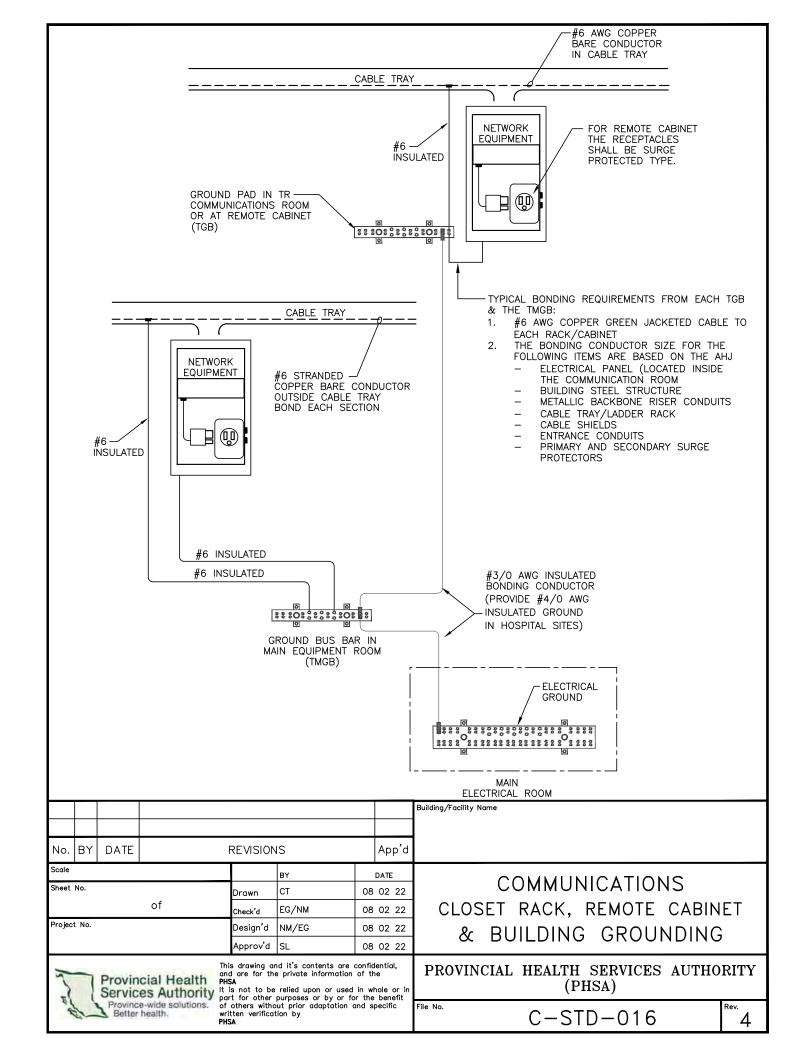
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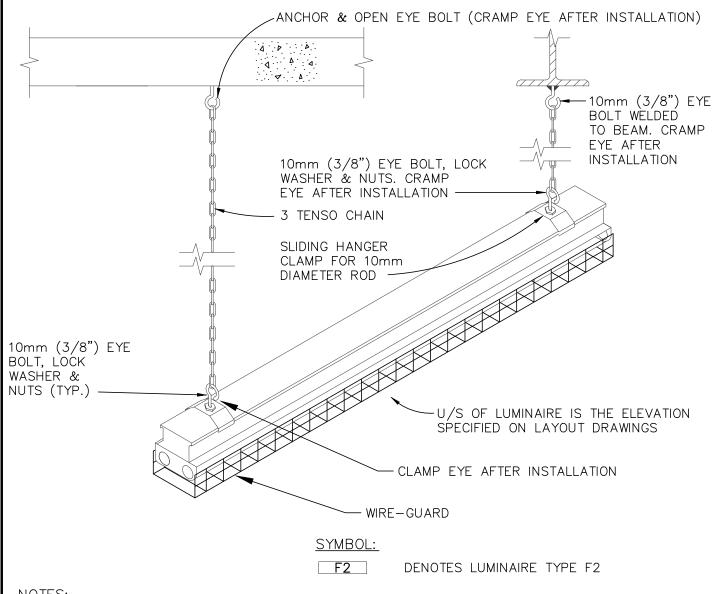
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File No. C-STD-014



## CONCRETE CEILING

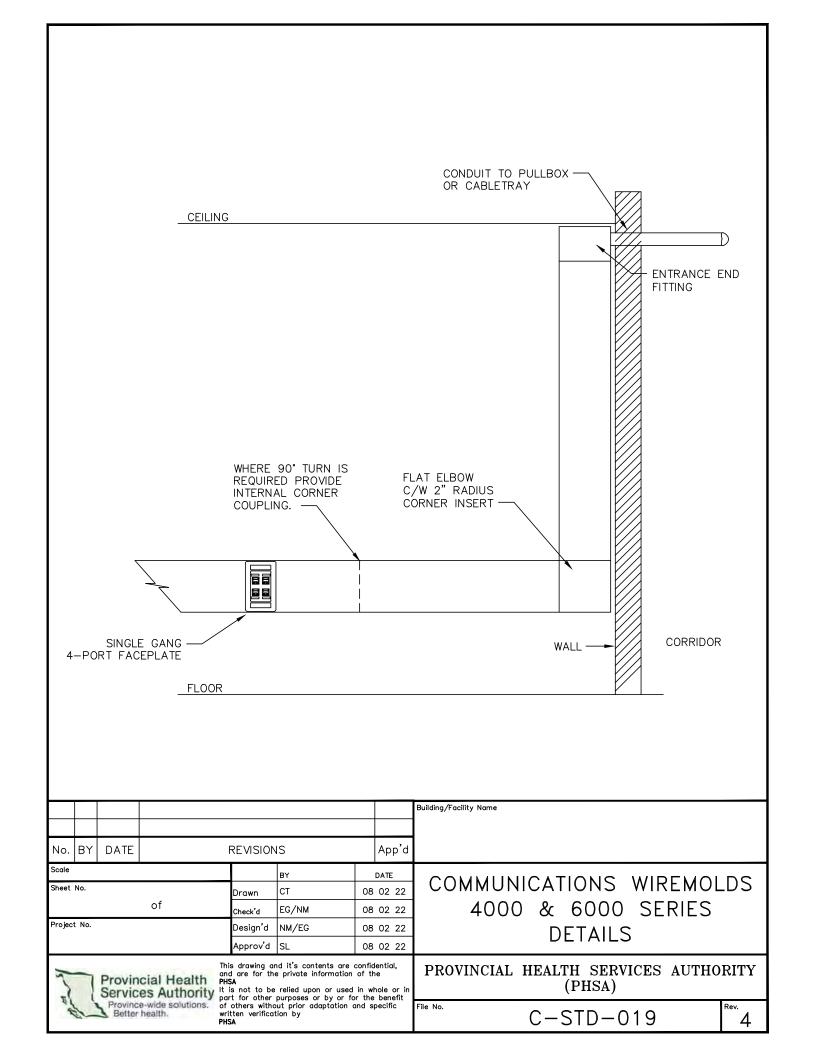
### STEEL BEAM

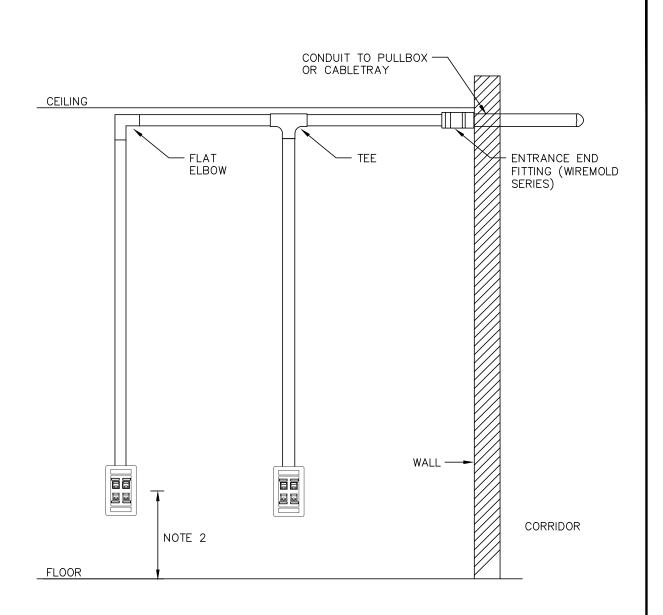


### NOTES:

1. EXACT HANGER DETAIL AT LUMINAIRE MAY VARY DEPENDING ON MAKE AND MODEL OF LUMINAIRE. WHERE MULTIPLE LUMINAIRES ARE REQUIRED IN A ROW (UP TO ONE LUMINAIRE GAP BETWEEN LUMINAIRES) USE 41mm 2 41mm SQUARE RACEWAY MOUNTED ON TOP OF LUMINAIRES. RACEWAY SHALL BE SUPPORTED AS SHOWN AT MAXIMUM 2440mm INTERVALS.

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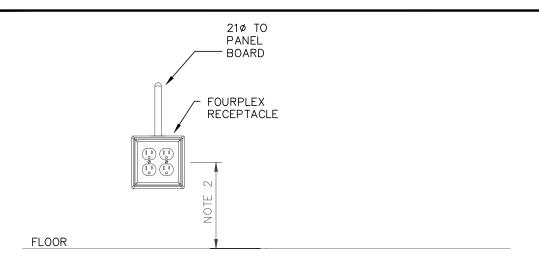




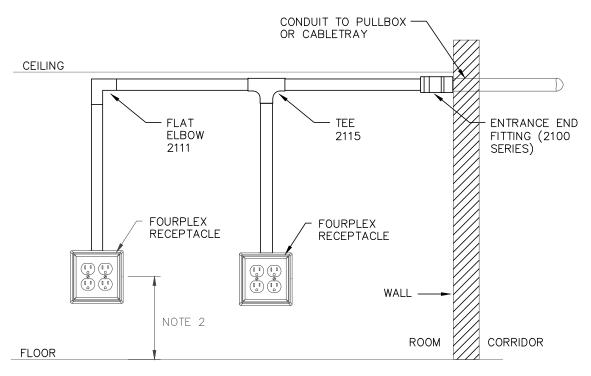
## NOTES:

- 1. WHERE 90° TURN IS REQUIRED PROVIDE INTERNAL CORNER COUPLING.
- 2. 305mm OR MOUNTING HEIGHT TO MATCH EXISTING OUTLET MOUNTING HEIGHT IN THE SAME ROOM.

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# SURFACE MOUNTED RECEPTACLE OUTLETS (CONDUIT SYSTEM)

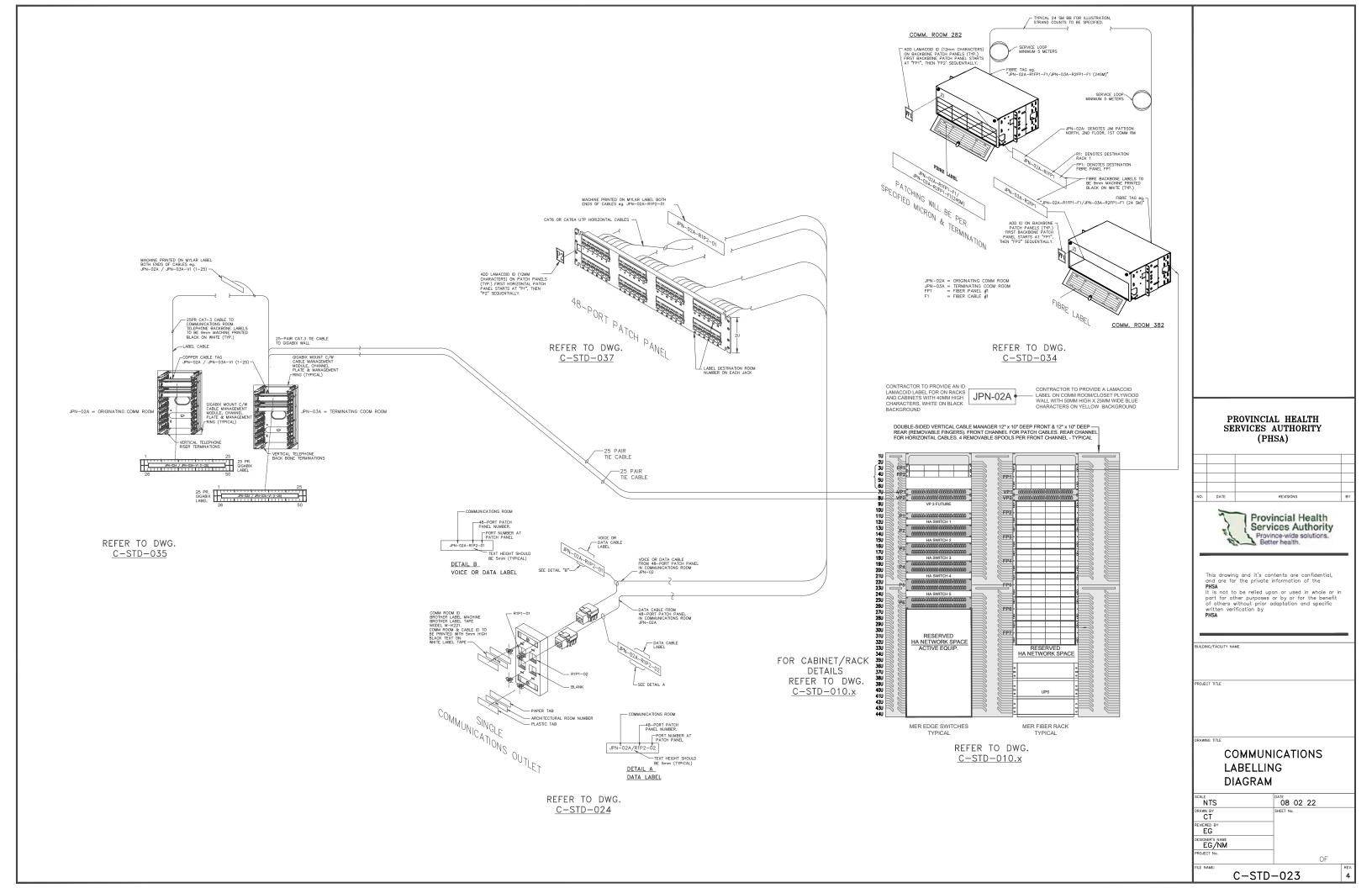


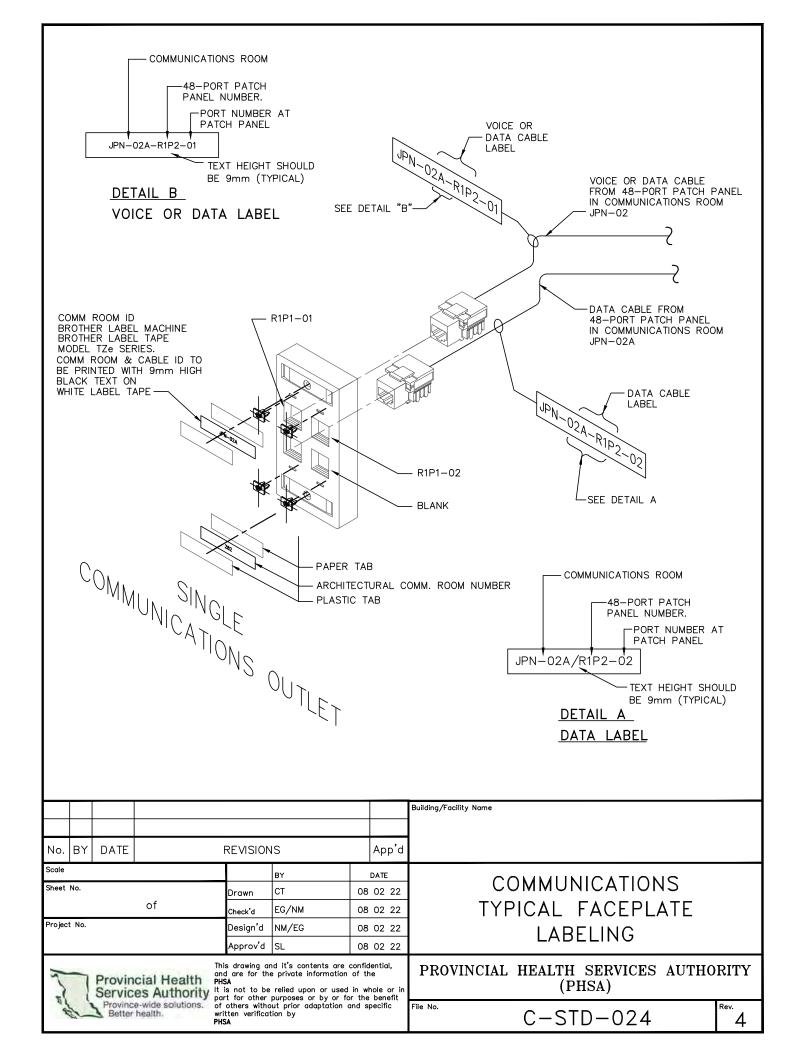
# SURFACE MOUNTED RECEPTACLE OUTLETS (WIREMOLD SYSTEM)

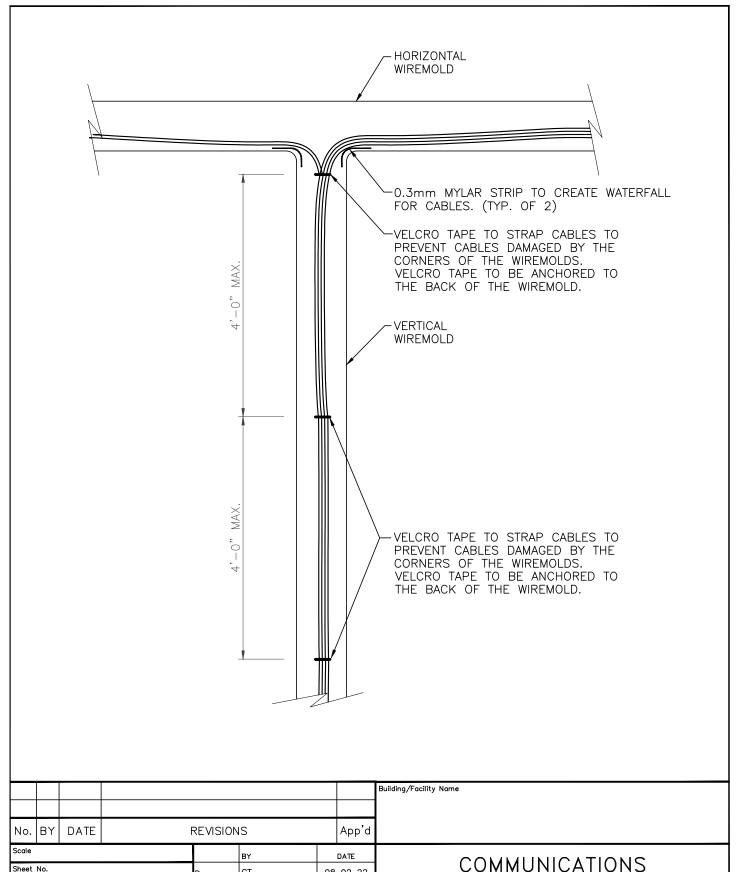
## NOTES:

- WHERE 90° TURN IS REQUIRED PROVIDE INTERNAL CORNER COUPLING (2117TC).
- 2. 305mm OR MOUNTING HEIGHT TO MATCH EXISTING OUTLET MOUNTING HEIGHT IN THE SAME ROOM.

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& 6000 WIREMOLD VERTICAL RISER

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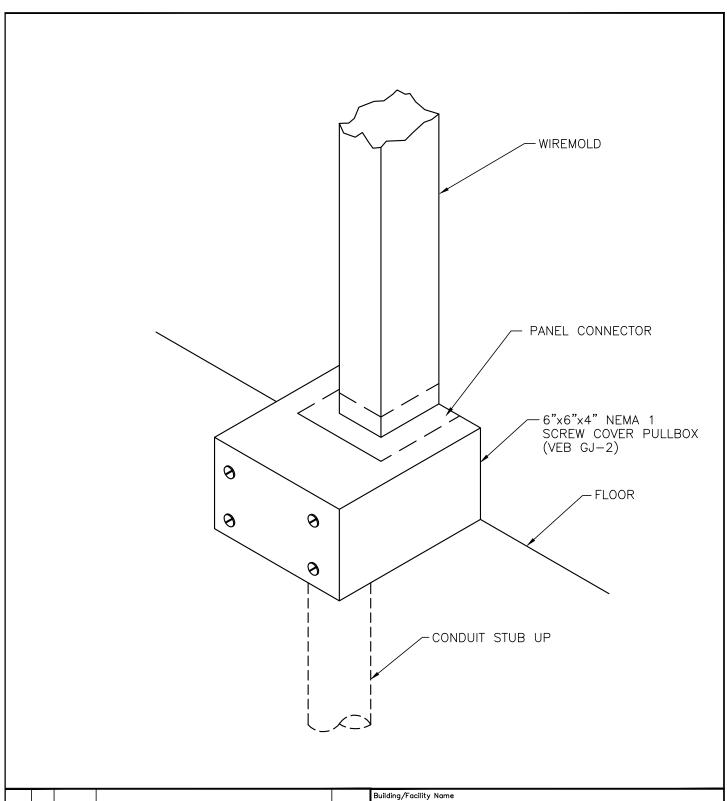
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Writer PHSA

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File No. C-STD-027



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COMMUNICATIONS TYPICAL CONNECTION BETWEEN CONDUIT & 4000/6000 WIREMOLD

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Writer PHSA

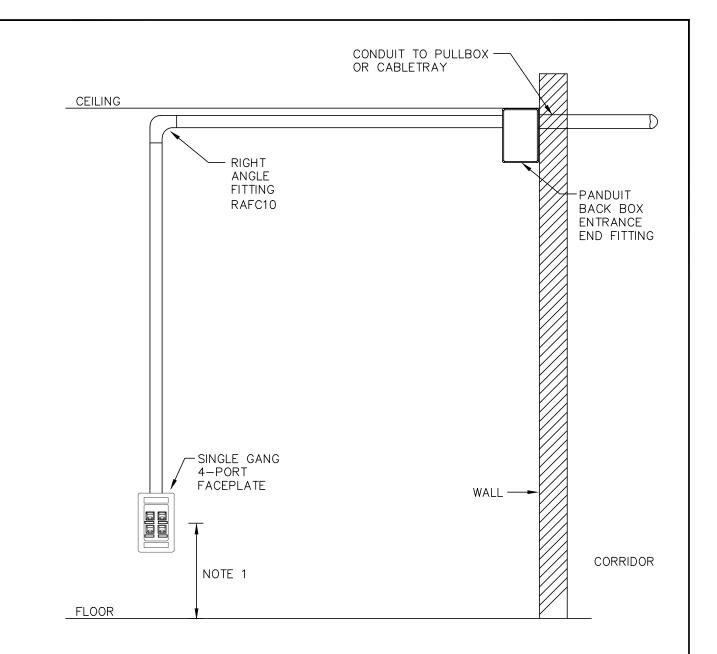
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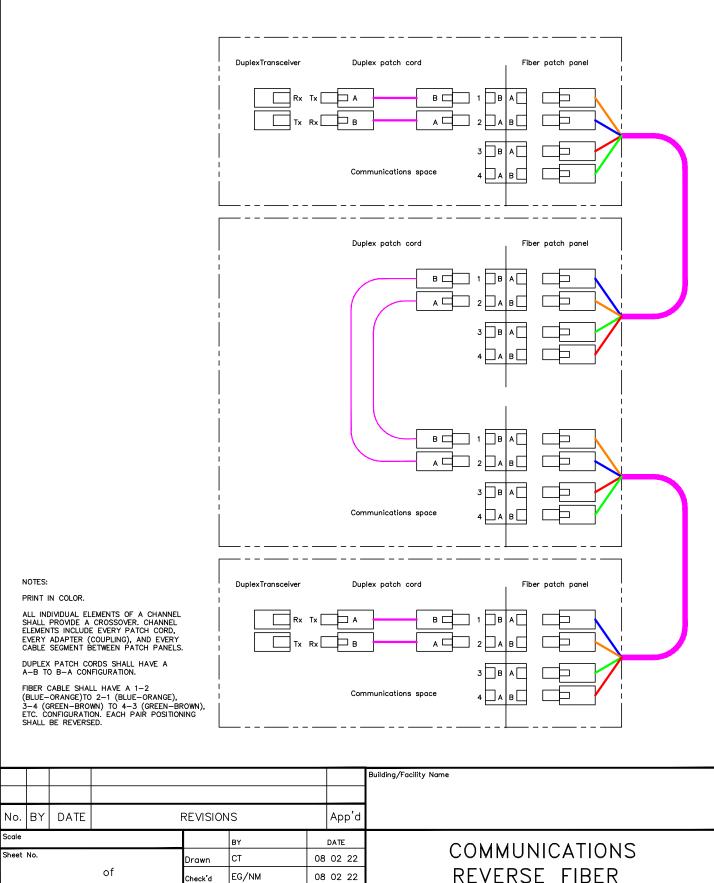
File No. C-STD-028



## NOTES:

- 1. 305mm OR MOUNTING HEIGHT TO MATCH EXISTING OUTLET MOUNTING HEIGHT IN THE SAME ROOM.
- 2. MINIMUM CABLE BENDING RADIUS SHALL BE 1" OR 25mm.

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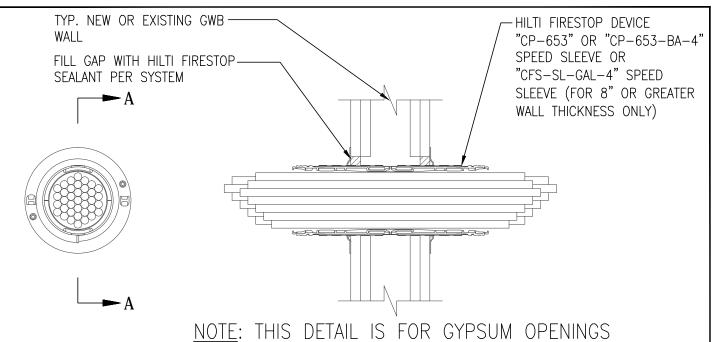
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REVERSE FIBER PAIR POSITIONING

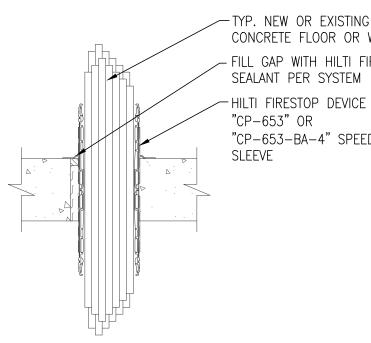
PROVINCIAL HEALTH SERVICES AUTHORITY (PHSA)

C-STD-032



INSTALL PER HILTI SYSTEM DRAWING W-L-3334

NOTE: THE FIRESTOP SYSTEM DRAWINGS REFERENCED IN FIRE STOP SECTION 27 05 29 AND THE PHSA C-STD DRAWINGS ARE TO BE USED FOR REFERENCE ONLY. CONTRACTOR IS RESPONSIBLE TO OBTAIN THE MOST CURRENT DRAWINGS AVAILABLE FROM THE FIRE STOP MANUFACTURER FOR ANY PROJECT.

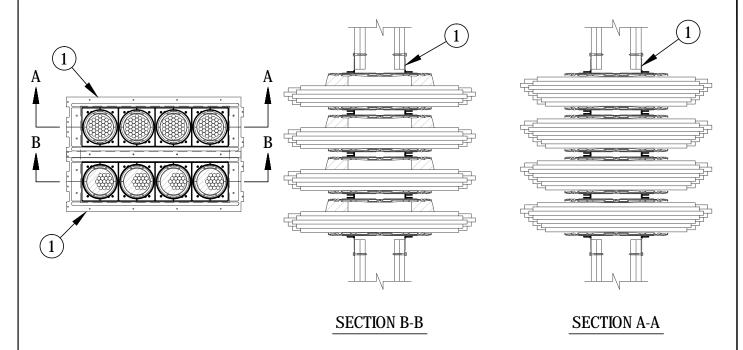


CONCRETE FLOOR OR WALL FILL GAP WITH HILTI FIRESTOP SEALANT PER SYSTEM HILTI FIRESTOP DEVICE "CP-653" OR "CP-653-BA-4" SPEED SLEEVE

NOTE: THIS DETAIL IS FOR CORED OPENINGS INSTALL PER HILTI SYSTEM DRAWING C-AJ-3283 OR C-J-3285

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THIS IS AN ILLUSTRATION OF A GANGPLATE FOR THE HILT CP 653-4" I SPEED SLEEVES THE PLATES ARE AVAILABLE FOR EITHER 3 OR 4 SLEEVE PLATES. USE BLANKING CAPS WHEN SOME OF THE OPENINGS ARE NOT BEING USED

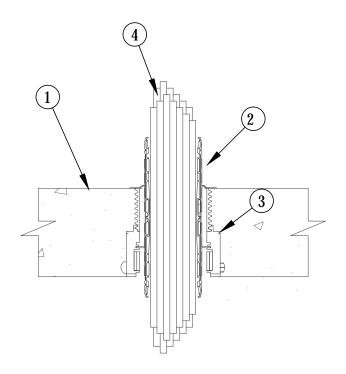


INSTALL PER HILTI SYSTEM DRAWING W-L-3395

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS—SL GP 16" AND 24" FIRESTOP GANGPLATE — CFS—SL GP CAP FIRESTOP GANGPLATE CAP

- 1. FIRESTOP DEVICE\* THE FIRESTOP DEVICE CONSISTS OF A STEEL PLATE SANDWICH CONSTRUCTION WITH THREE (16" DEVICE SIZE) OR FOUR (24" DEVICE SIZE) CIRCULAR OPENING PORTS WHICH ARE EACH NOM 4 IN. (102 MM) DIAM. THE FIRESTOP DEVICE IS INTENDED TO BE ORIENTED VERTICALLY OR HORIZONTALLY AND MOUNTED TO THE FACE OF THE OPENING ON BOTH SIDES OF WALL. THE 16" AND 24" FIRESTOP DEVICES WHEN ORIENTED HORIZONTALLY ARE ATTACHED TO THE 16 IN. (406 MM) AND 24 IN. (610 MM), RESPECTIVELY, CENTER TO CENTER SPACED WALL STUDS AT EACH SIDE OF OPENING, OVER THE GYPSUM BOARD.
- 2. THE FIRESTOP SYSTEM DRAWINGS REFERENCED IN FIRE STOP SECTION 27 05 29 AND THE PHSA C-STD DRAWINGS ARE TO BE USED FOR REFERENCE ONLY. CONTRACTOR IS RESPONSIBLE TO OBTAIN THE MOST CURRENT DRAWINGS AVAILABLE FROM THE FIRE STOP MANUFACTURER FOR ANY PROJECT.

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## INSTALL PER HILTI SYSTEM DRAWING F-A-3060

### COMBINATION CAST-IN-PLACE & SPEED SLEEVE ASSEMBLY

### NOTE:

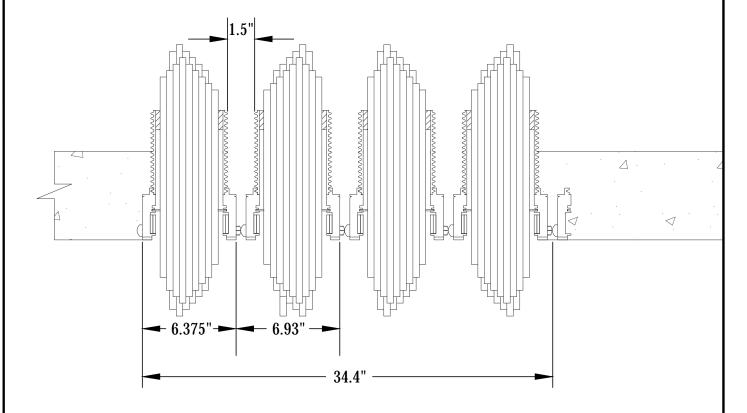
- 1) CONCRETE SLAB
- 2) HILTI SPEED SLEEVE CP 653-4"
- 3) HILTI CAST-IN-PLACE SLEEVE CP 680-P 4"
- 4) COMMUNICATION CABLES

### **GENERAL NOTES:**

- THIS DETAIL IS FOR RISER SLEEVES FOR COMMUNICATION ROOMS USING CAST—IN—PLACE SLEEVES IN COMBINATION WITH SPEED SLEEVES.
- ALL RISER SLEEVES ARE COMMUNICATION CABLES ONLY; DO NOT USE FOR CONDUIT OR POWER CIRCUITS
- CONTRACTOR IS REQUIRED TO OBTAIN THE LATEST SYSTEM DRAWING FROM HILTI.

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## HILTI CP-680-P-4" CAST IN PLACE SLEEVES



## **GENERAL NOTES:**

CONTRACTOR IS REQUIRED TO OBTAIN THE LATEST SYSTEM DRAWING FROM HILTI.

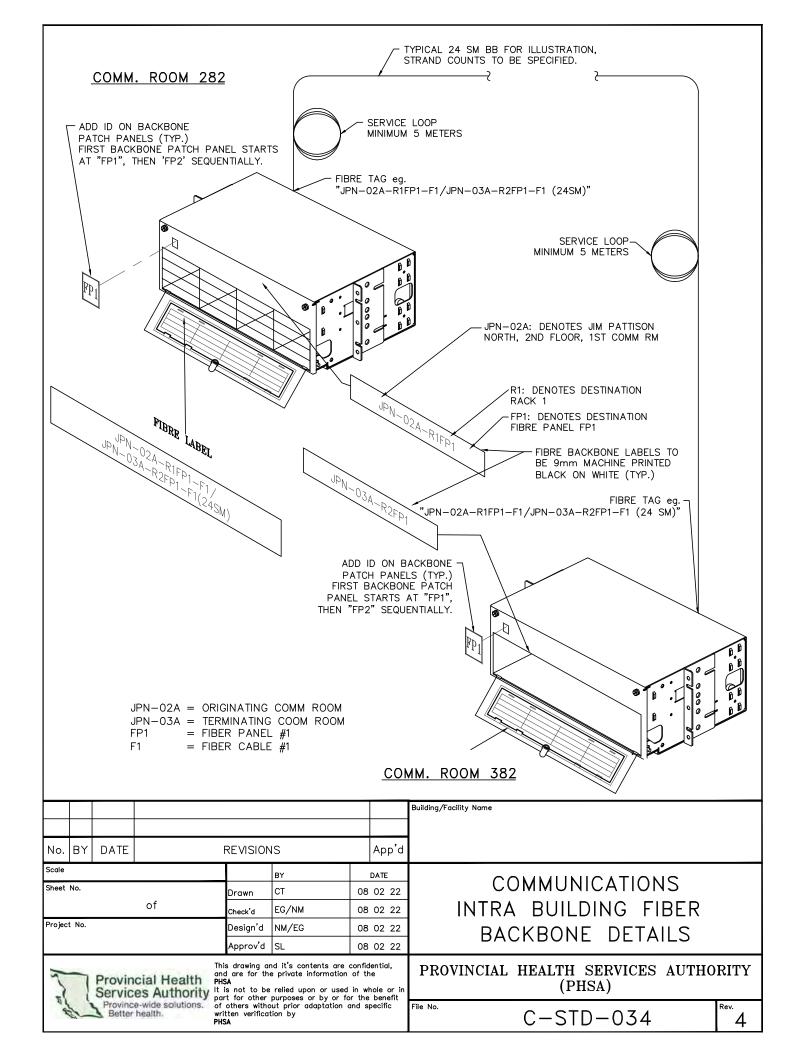
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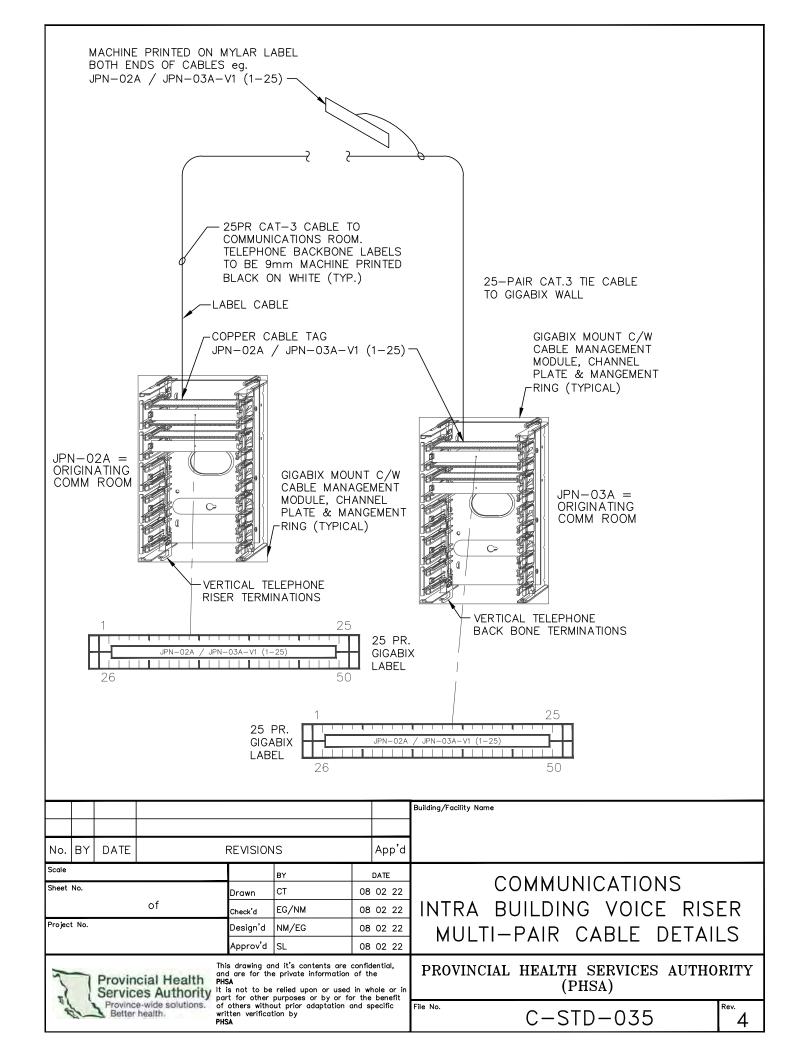
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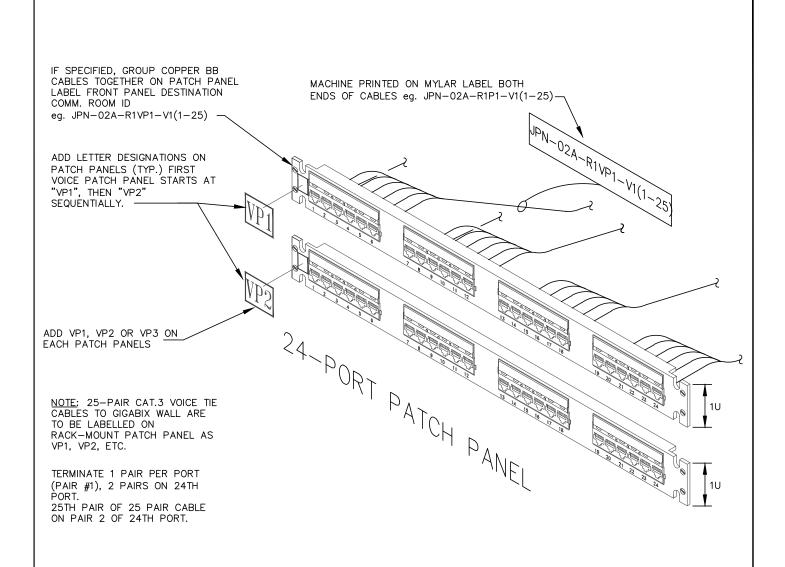
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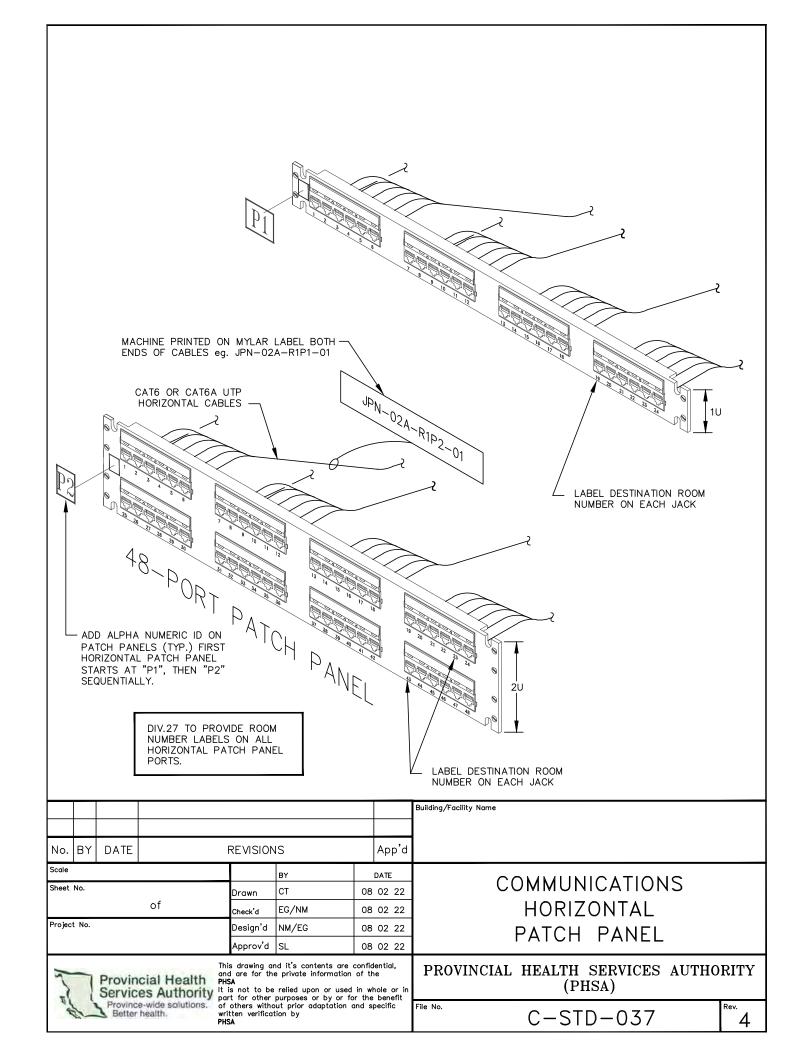
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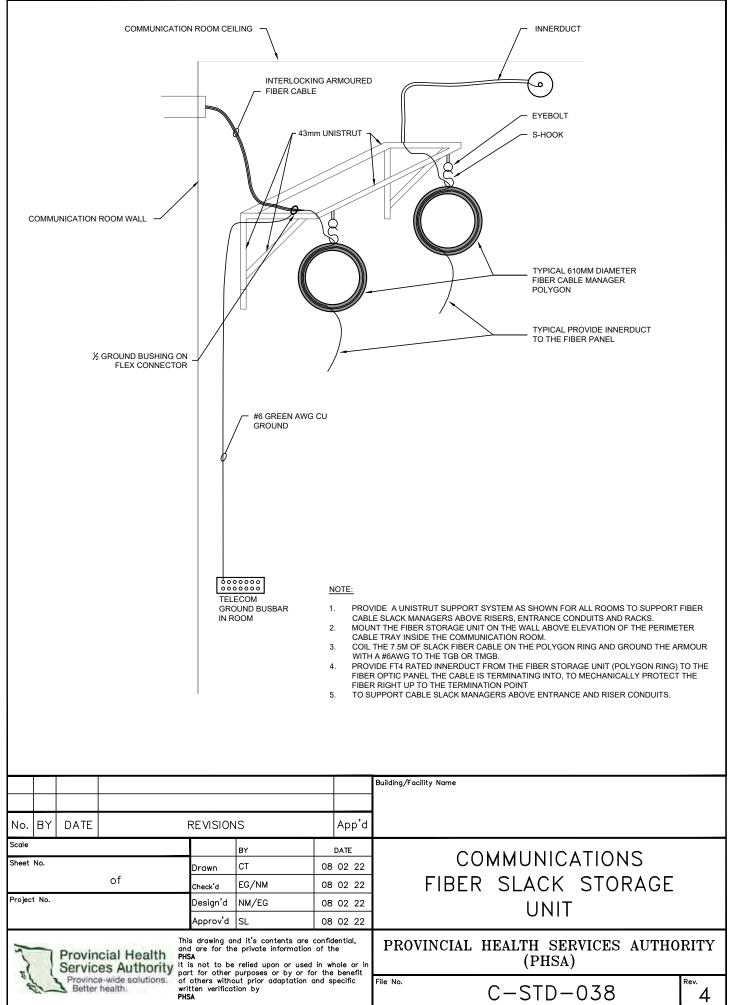
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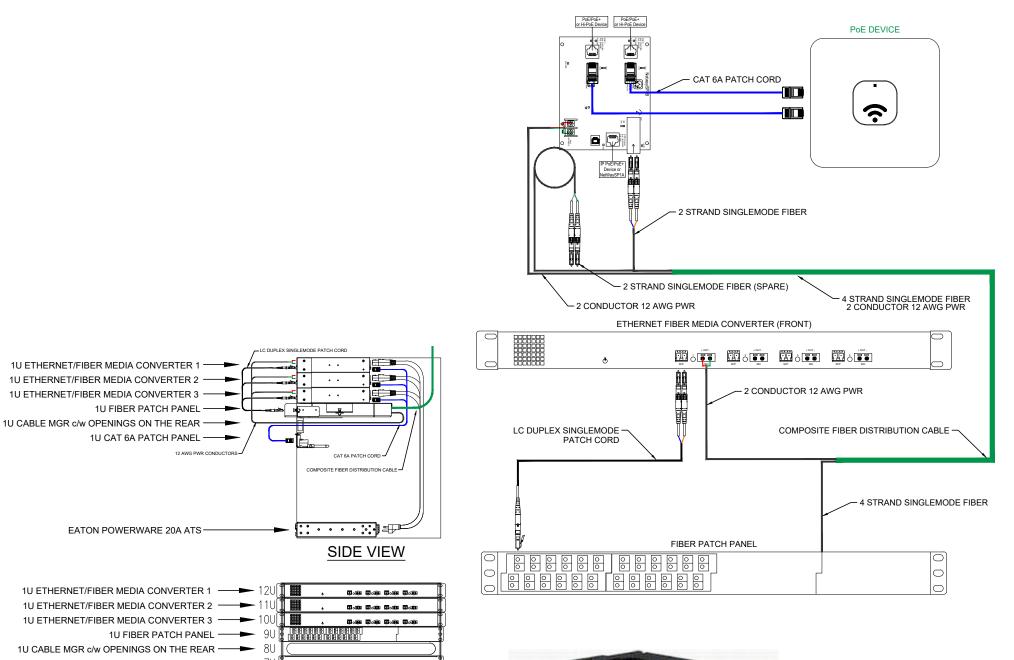
File No. C-STD-036

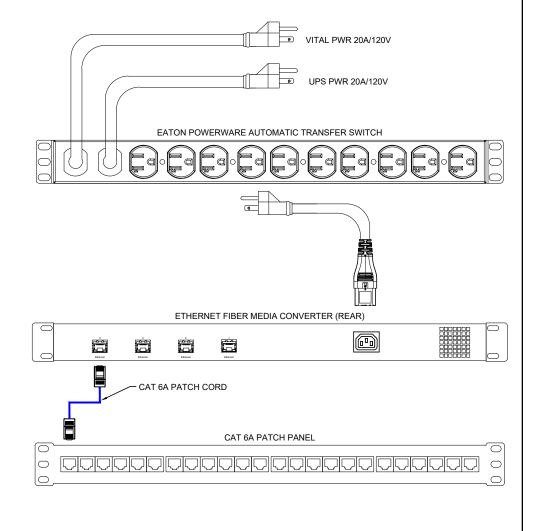




(PHSA)

C-STD-038





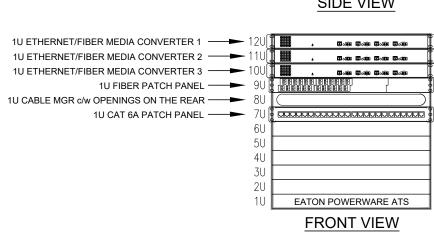
#### NOTES:

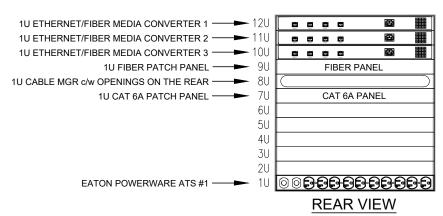
- 1. NO MORE THAN FOUR (4) MEDIA CONVERTERS SHALL BE PLUGGED INTO ONE (1) AUTOMATIC TRANSFER SWITCH.
- 2. 12 AWG POWER CONDUCTORS SHALL BE ROUTED THROUGH THE REAR OF THE FIBER PATCH PANEL. ROUTE THE POWER CABLES FROM THE FIBER PANEL BACK THROUGH THE 1U CABLE MANAGER AND CONNECT TO THE FRONT OF THE MEDIA CONVERTER.
- EACH EXTERIOR POE SWITCH SHALL BE LIMITED TO ONE (1) POE DEVICE PER SWITCH.
- ALL 4 STRANDS SHALL BE FUSION SPLICED WITH LC CONNECTORS . TERMINATE ALL FOUR STRANDS IN THE MER/TR FIBER PATCH PANEL.
- 5. PROVIDE FOUR (4) DUPLEX LC SM PATCH CORDS FOR EACH HARDENED SWITCH INSTALLED.

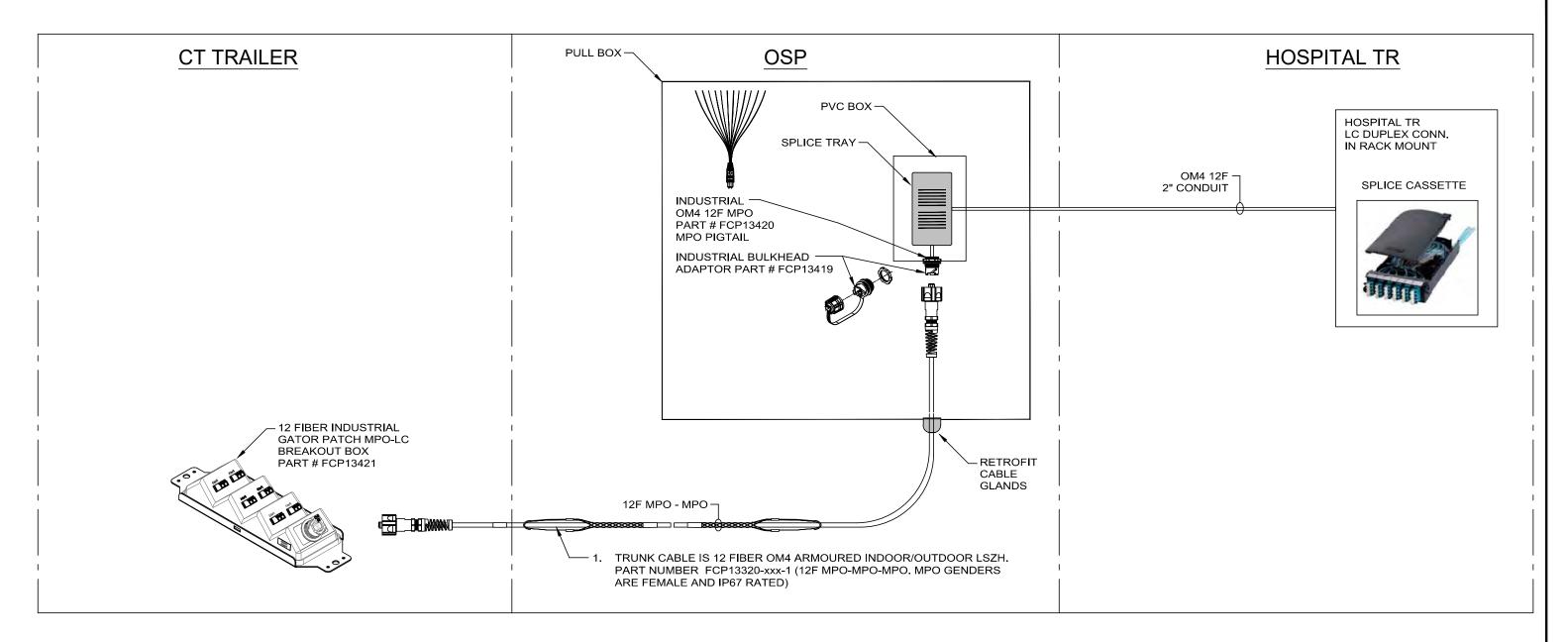




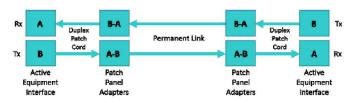
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S. E. S.		Servic	cial Health es Authority e-wide solutions. health.	and are for th <b>PHSA</b> It is not to be part for other	nd it's contents a e private informat relied upon or u- purposes or by oi put prior adaptatic tion by	ion of th sed in wh r for the	e nole or in benefit	PROVINCIAL	HEALTH SERVICES AT (PHSA)  C-STD-039	UTHORITY  Rev. 4



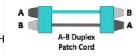




IF YOU LOOK AT THE GRAPHIC BELOW, YOU CAN EASILY SEE THAT THE Tx (B) SHOULD ALWAYS CONNECT TO THE Rx (A), REGARDLESS OF MANY PATCH PANEL ADAPTERS OR CABLE SEGMENTS ARE IN THE CHANNEL. IF POLARITY IS NOT MAINTAINED, SUCH AS CONNECTING A TRANSMITTER TO A TRANSMITTER (B TO B), DATA SIMPLY WILL NOT FLOW. OBVIOUS RIGHT?



TO HELP THE INDUSTRY TO SELECT AND INSTALL THE RIGHT COMPONENTS TO MAINTAIN PROPER POLARITY, TIA-568-C STANDARDS RECOMMENDS THE A-B POLARITY SCENARIO FOR DUPLEX PATCH CORDS. THE A-B DUPLEX PATCH CORD (i.e. B-A AND A-B) MAINTAINS THE A-B POLARITY IN A

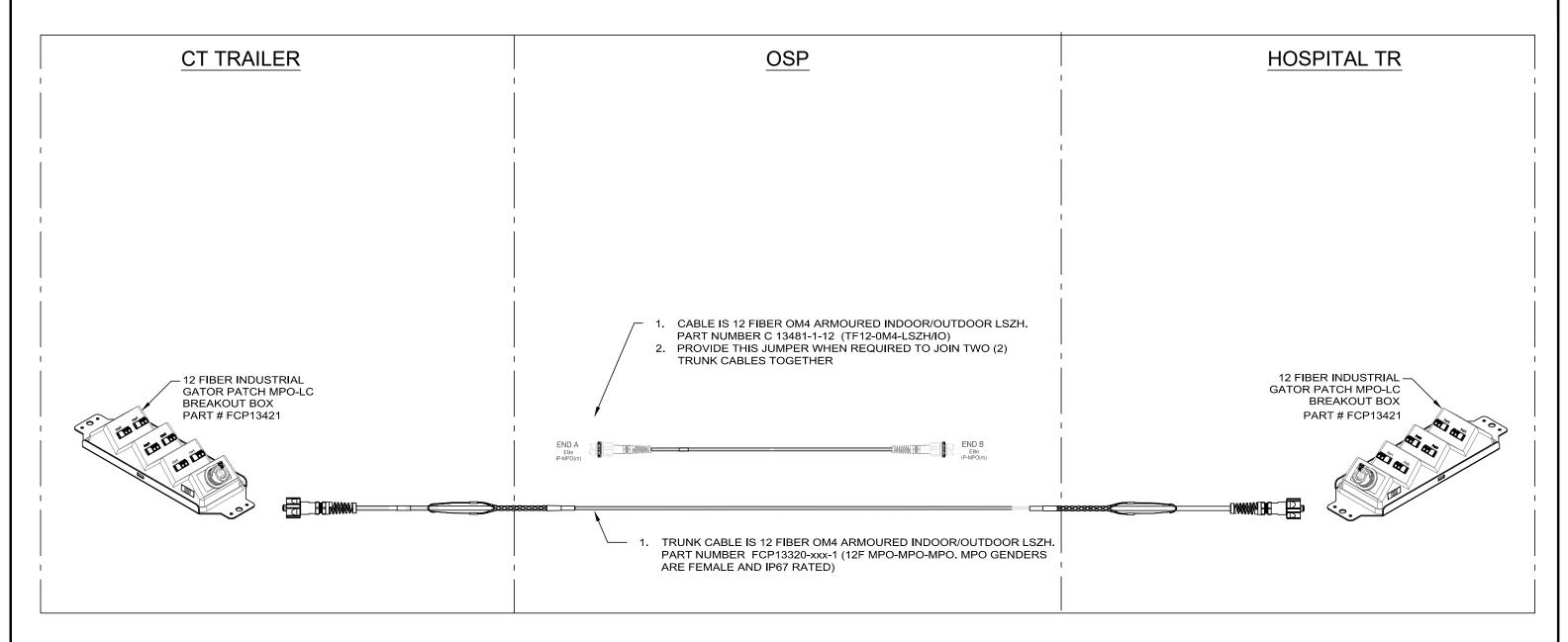


DUPLEX CHANNEL. IT'S ALSO IMPORTANT TO NOTE THAT EVERY FIBER CONNECTOR HAS A KEY THAT PREVENTS THE FIBER FROM ROTATING WHEN THE CONNECTORS ARE BEING MATED AND MAINTAINS THE CORRECT TX AND RX POSITION.

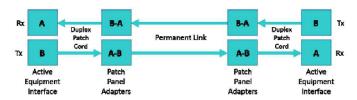
#### NOTES:

1. ALL INDIVIDUAL ELEMENTS OF A CHANNEL SHALL PROVIDE A 'B-A' and 'A-B' POLARITY. CHANNEL ELEMENTS INCLUDE EVERY PATCH PANEL CORD, EVERY ADAPTOR (COUPLER) AND PERMANENT LINK (FIBER CABLE BETWEEN PATCH PANELS). FIBER CABLE SHALL HAVE A 1-2 TO 2-1 CONFIGURATION, OR A-B TO B-A. EACH PAIR POSITIONING SHALL BE REVERSED.

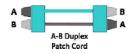
							Building/Facility Name
No.	BY	DATE		REVISION	S	App'd	
Scale					BY	DATE	CT TRAILER
Sheet	No.			Drawn	СТ	08 02 22	
			of	Check'd	EG/NM	08 02 22	FIBER UMBILICAL CORD
Projec	et No.			Design'd	NM/EG	08 02 22	OPTION 1
				Approv'd	SL	08 02 22	0111014 1
1		Provin		and are for the	nd it's contents are e private information relied upon or used purposes or by or f	of the	PROVINCIAL HEALTH SERVICES AUTHORITY (PHSA)
E	8	Province Better	e-wide solutions. health.	of others without written verificate	ut prior adaptation	and specific	File No. C—STD—040



IF YOU LOOK AT THE GRAPHIC BELOW, YOU CAN EASILY SEE THAT THE Tx (B) SHOULD ALWAYS CONNECT TO THE Rx (A), REGARDLESS OF MANY PATCH PANEL ADAPTERS OR CABLE SEGMENTS ARE IN THE CHANNEL. IF POLARITY IS NOT MAINTAINED, SUCH AS CONNECTING A TRANSMITTER TO A TRANSMITTER (B TO B), DATA SIMPLY WILL NOT FLOW. OBVIOUS RIGHT?



TO HELP THE INDUSTRY TO SELECT AND INSTALL THE RIGHT COMPONENTS TO MAINTAIN PROPER POLARITY, TIA-568-C STANDARDS RECOMMENDS THE A-B POLARITY SCENARIO FOR DUPLEX PATCH CORDS. THE A-B DUPLEX PATCH CORD (i.e. B-A AND A-B) MAINTAINS THE A-B POLARITY IN A DUPLEX CHANNEL IT'S ALSO IMPORTANT TO NOTE

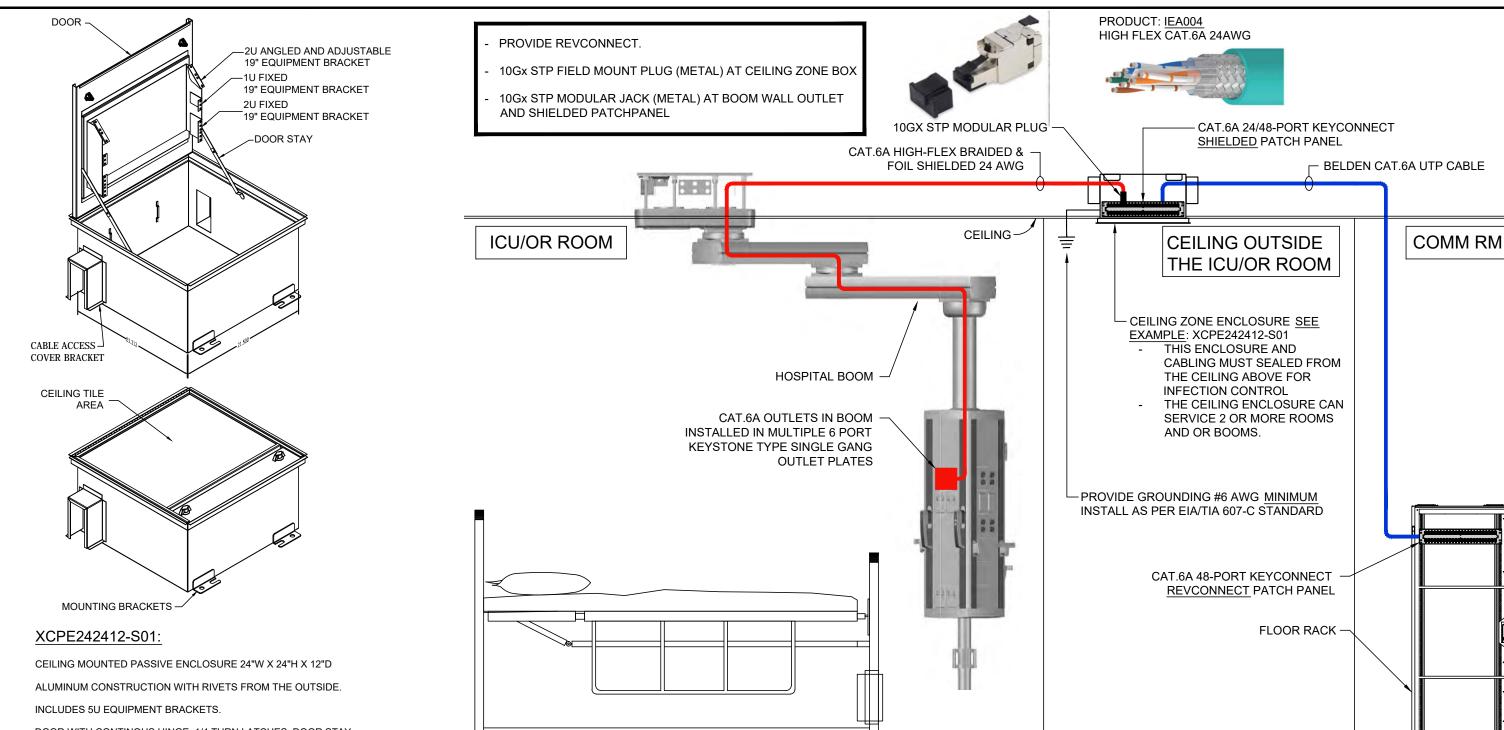


DUPLEX CHANNEL. IT'S ALSO IMPORTANT TO NOTE THAT EVERY FIBER CONNECTOR HAS A KEY THAT PREVENTS THE FIBER FROM ROTATING WHEN THE CONNECTORS ARE BEING MATED AND MAINTAINS THE CORRECT TX AND RX POSITION.

#### NOTES:

1. ALL INDIVIDUAL ELEMENTS OF A CHANNEL SHALL PROVIDE A (B-A and A-B POLARITY). CHANNEL ELEMENTS INCLUDE EVERY PATCH PANEL CORD, EVERY ADAPTOR (COUPLER) AND PERMANENT LINK (FIBER CABLE BETWEEN PATCH PANELS). FIBER CABLE SHALL HAVE A 1-2 TO 2-1 CONFIGURATION, OR A-B TO B-A. EACH PAIR POSITIONING SHALL BE REVERSED.

							Building/Facility Name							
No.	BY	DATE		REVISION	IS	App'd								
Scale					BY	DATE	CT TRAILER							
Sheet	No.			Drawn	СТ	08 02 22								
			of	Check'd	EG/NM	08 02 22	FIBER UMBILICAL CORD							
Proje	ct No.			Design'd	NM/EG	08 02 22	OPTION 2							
				Approv'd	SL	08 02 22	OT HOR Z							
15		Service	cial Health	and are for th PHSA It is not to be	nd it's contents are e private information relied upon or use purposes or by or	n of the d in whole or in	PROVINCIAL HEALTH SERVICES AUTHORITY (PHSA)							
B	8	L Provinc	e-wide solutions. health.		out prior adaptation		C-STD-041 Rev. 4							



DOOR WITH CONTINOUS HINGE, 1/4 TURN LATCHES, DOOR STAY ON LEFT AND RIGHT, AND FOAM GASKET AROUND PERIMETER.

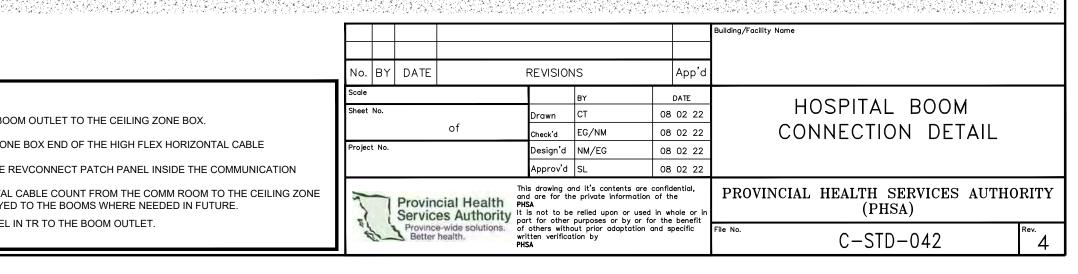
CABLE ACCESS IN THE LEFT TO RIGHT ENDS WITH COVER BRACKETS AND EDGE GUARD TO PROTECT CABLE. FOAM SEAL KIT INCLUDED

FINISH: FLAT EPOXY WHITE POWDERCOAT

EIA-310-D compliant UL listed UL 2043

## NOTES:

- 1. PROVIDE BELDEN 10GX52F HIGH-FLEX FOIL SHIELDED HORIZONTAL CABLE BETWEEN THE BOOM OUTLET TO THE CEILING ZONE BOX.
- 1.1. TERMINATE ON REVCONNECT METAL SHIELDED STP 10GX JACKS FOR BOOM OUTLETS
- 1.2. TERMINATE ON FIELD MOUNT METAL REVCONNECT 10GX STP PLUGS AT THE CEILING ZONE BOX END OF THE HIGH FLEX HORIZONTAL CABLE
- 2. PROVIDE BELDEN 10GX UTP HORIZONTAL CABLE BETWEEN THE CEILING ZONE BOX AND THE REVCONNECT PATCH PANEL INSIDE THE COMMUNICATION ROOM.
- 2.1. NOTE: THE HORIZONTAL OUTLET COUNT IN THE BOOM IS 66% OF THE TOTAL HORIZONTAL CABLE COUNT FROM THE COMM ROOM TO THE CEILING ZONE BOX PATCH PANEL. THIS PROVIDES 33% SPARE INSIDE THE CEILING BOX TO BE DEPLOYED TO THE BOOMS WHERE NEEDED IN FUTURE.
- 3. THE MAXIMUM PERMANENT LINK LENGTH IS 80 METERS. (MEASURED FROM THE PATCHPANEL IN TR TO THE BOOM OUTLET



FLOOR-

	Α	В	С	D	Е	F	G	Н	l	J	Κ	L	М	Ν	0	Р	Q	R	S
1	PHSA - Network Edge Horizontal Cable Information																		
2	Horizontal Cable Information												PLE D	ATA F	ORMAT ON	ILY - PLEASE DELETE IT	BEFORE	ENTERING	S NEW DATA
3	Note: Submit Telecom Room ID to Network Edge for approval upon award of contract.																		
4	Originating Endpoint - (Communications Room)											T	ermi	natin	g Endpoi	nt - (User Space)			
5	Use	l ( 'ahla	Teleco m Arch Room #	Room ID	Termination type			Patch Panel Port	I SWITCH/VOICE Pa	atch ID		Bldg Code			Terminatio n type	Full Cable ID	Coy Name	Install Date	Other Linkage Records
6									Switch ID	Port ID									
7	WP	Cat 6			Patch Panel		VP1	.01	Voice Patch Panel	R1VP1-01		WLD	01	25	RJ45	WLD-01A-R1P1-01(WP)	ABC	1-Feb-18	WLD-B1A/WLD-01A-V1.001
8	WP	Cat 6	20	WLD-01A	Patch Panel	R1	P1	.02	R1-SW01-1	1		WLD	01	25	RJ45	WLD-01A-R1P1-02(WP)	ABC	1-Feb-18	
9	Voice	Cat 6			Patch Panel		P1	.03	R1-SW01-1	3		WLD	01	25	RJ45	WLD-01A-R1P1-03	ABC	1-Feb-18	
10	Data	Cat 6	20	WLD-01A	Patch Panel	R1	P1	.04	R1-SW01-1	5		WLD	01	25	RJ45	WLD-01A-R1P1-04	ABC	1-Feb-18	
11	Data	Cat 6	20	WLD-01A	Patch Panel	R1	P1	.05	R1-SW01-1	7		WLD	01	38	RJ45	WLD-01A-R1P1-05	ABC	1-Feb-18	
12	Data	Cat 6	20	WLD-01A	Patch Panel	R1	P1	.06	R1-SW01-1	9		WLD	01	38	RJ45	WLD-01A-R1P1-06	ABC	1-Feb-18	

	Α	В	С	D	Е	F	G	Н		J	К	L	М	N
1	PHS/	A - Netwo	rk Eda	e										
2	Intra	-Building	UTP R	Riser Cal	ole Information	1			SAMPI	F DATA F	ORMAT ONLY - I	PLEASE DELETE IT BEFORE E	NTFRING	NEW DATA
			<u> </u>							L DATAT.		LEAGE BEEFIN BEFORE E	,,,,,,,,,	NEW BAIA
3														
4			Origin	ating En	dpoint- (Main	Equipment Room)		Т	erminat	ing Endp	oint- (Local C	communications Room)		
5	Туре	Cable	Floor Code	Telecom Room #	Telecom Room ID	Termination type		Floor Code	Telecom Room #	Telecom Room ID	Termination type	Full Cable ID	Coy Name	Install Date
6														
7	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.001	ABC	1-Feb-18
8	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.002	ABC	1-Feb-18
9	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.003	ABC	1-Feb-18
10	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.004	ABC	1-Feb-18
11	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.005	ABC	1-Feb-18
12	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.006	ABC	1-Feb-18
13	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.007	ABC	1-Feb-18
14	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.008	ABC	1-Feb-18
15	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.009	ABC	1-Feb-18
16	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.010	ABC	1-Feb-18
17	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.011	ABC	1-Feb-18
18	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.012	ABC	1-Feb-18
19	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.013	ABC	1-Feb-18
20	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.014	ABC	1-Feb-18
21	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.015	ABC	1-Feb-18
22	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.016	ABC	1-Feb-18
23	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.017	ABC	1-Feb-18
24	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.018	ABC	1-Feb-18
25	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.019	ABC	1-Feb-18
26	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.020	ABC	1-Feb-18
27	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.021	ABC	1-Feb-18
28	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.022	ABC	1-Feb-18
29	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.023	ABC	1-Feb-18
30	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.024	ABC	1-Feb-18
31	UTP	Tel 25 pair	01	123	JPN-01A	GigaBix		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-V1.025	ABC	1-Feb-18
32														
33	UTP	Cat6	01	123	JPN-01A	Patch Panel		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-R1P1-BB1	ABC	1-Feb-18
34	UTP	Cat6	01	123	JPN-01A	Patch Panel	<u> </u>	02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-R1P1-BB2	ABC	1-Feb-18
35	UTP	Cat6	01	123	JPN-01A	Patch Panel	<u> </u>	02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-R1P1-BB3	ABC	1-Feb-18
36	UTP	Cat6	01	123	JPN-01A	Patch Panel		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-R1P1-BB4	ABC	1-Feb-18
37	UTP	Cat6	01	123	JPN-01A	Patch Panel	<u> </u>	02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-R1P1-BB5	ABC	1-Feb-18
38	UTP	Cat6	01	123	JPN-01A	Patch Panel		02	234	JPN-02B	GigaBix	JPN-01A/JPN-02B-R1P1-BB6	ABC	1-Feb-18

	Α	В	С	D	E	F	G	Н	ı	J	K	L	М	N	0
1	PHSA	- Network I	Edge												
2	Inter-E	<b>Building UT</b>	P Ris	er Cable	Information				SAI	IPLE DATA	FORMAT ON	NLY - PLEASE DELETE IT BEF	ORE ENTE	RING NEW I	DATA
3															
4			Ori	ginating	Endpoint- (M	lain Equipment Room)		T	ermina	ting End	point- (Ma	in Equipment Room)			
5	Туре	Cable		Telecom Room #	Telecom Room ID	Termination type		Floor Code	Teleco m Room#	Telecom Room ID	Terminatio n type	Full Cable ID	Coy Name	Install Date	Other Linkage Records
6															
7	UTP	Tel 100 pair	01	500	JPN-01A	GigaBix		01	100	JPS-01A	GigaBix	JPN-01/JPS-01B-V1.001	ABC	1-Feb-18	
8	UTP	Tel 100 pair	01	500	JPN-01A	GigaBix		01	100	JPS-01A	GigaBix	JPN-01/JPS-01B-V1.002	ABC	1-Feb-18	
9	UTP	Tel 100 pair	01	500	JPN-01A	GigaBix		01	100	JPS-01A	GigaBix	JPN-01/JPS-01B-V1.003	ABC	1-Feb-18	
10	UTP	Tel 100 pair	01	500	JPN-01A	GigaBix		01	100	JPS-01A	GigaBix	JPN-01/JPS-01B-V1.004	ABC	1-Feb-18	

	Α	В	С	D	E	F	G	Н	П	J K	L	М	N	0	Р	Q	R	S	Т	U	V	W
1	PHSA -	Netw	ork Ed	ae																		
-					able Information						SAMI	PI F DAT	A FORM	AT ONLY - PLEASE	DEI I	I FTF IT	REE	ORE	FN	TERING NEW DATA		
1	III a Bu		g 1 1001	11.00. 0	able imermation							LL DA	A I OKIIII	I	DELL	1	<i>DL,</i>			IENNO NEW BATA		
3																						
4			Origina	ating En	<b>dpoint-</b> (Main Eqւ	ıipm	ent F	loor	n)		Ter	minati	ng Endp	oint- (Local Com	mun	icatio	ns F	Roor	n)			
5	Fiber Type	Floor Code	Teleco m Room#	Telecom Room ID		Rack ID	Patch Panel	Bay	Cable	Strand	Floor Code	Teleco m Room#	Telecom Room ID	Termination type	Rack ID	Patch Panel	Bay	Cable ID	Strand	Full Cable ID	Coy Name	Install Date
6																						
7	MM OM4	01	123		LC, SC, ST or MTRJ				F1	.1	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	.4	F1	.1	JPN-01A-R1FP1.1-F1.1/JPN-02A-R1FP1.4-F1.1	ABC	1-Feb-18
	MM OM4	01	123		LC, SC, ST or MTRJ			.1	F1	.2	02	223		LC, SC, ST or MTRJ		FP1	.4	F1	.2	JPN-01A-R1FP1.1-F1.2/JPN-02A-R1FP1.4-F1.2		1-Feb-18
	MM OM4	01	123		LC, SC, ST or MTRJ					.3	02	223		LC, SC, ST or MTRJ		FP1	.4	F1	.3	JPN-01A-R1FP1.1-F1.3/JPN-02A-R1FP1.4-F1.3		1-Feb-18
	MM OM4	01	123		LC, SC, ST or MTRJ				F1	.4	02	223		LC, SC, ST or MTRJ		FP1	.4	F1	.4	JPN-01A-R1FP1.1-F1.4/JPN-02A-R1FP1.4-F1.4		1-Feb-18
	MM OM4	01	123		LC, SC, ST or MTRJ			.1	F1	.5	02	223		LC, SC, ST or MTRJ		FP1	.4	F1	.5	JPN-01A-R1FP1.1-F1.5/JPN-02A-R1FP1.4-F1.5	ABC	1-Feb-18
	MM OM4	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	.1	F1	.6	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	.4	F1	.6	JPN-01A-R1FP1.1-F1.6/JPN-02A-R1FP1.4-F1.6	ABC	1-Feb-18
13	MM OM4	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	.1	F1	.7	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	.4	F1	.7	JPN-01A-R1FP1.1-F1.7/JPN-02A-R1FP1.4-F1.7	ABC	1-Feb-18
	MM OM4	01	123		LC, SC, ST or MTRJ			.1	F1	.8	02	223		LC, SC, ST or MTRJ	R1	FP1	.4	F1	.8	JPN-01A-R1FP1.1-F1.8/JPN-02A-R1FP1.4-F1.8	ABC	1-Feb-18
15	MM OM4	01	123		LC, SC, ST or MTRJ			.1	F1	.9	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	.4	F1	.9	JPN-01A-R1FP1.1-F1.9/JPN-02A-R1FP1.4-F1.9	ABC	1-Feb-18
16	MM OM4	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	.1	F1	.10	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	.4	F1	.10	JPN-01A-R1FP1.1-F1.10/JPN-02A-R1FP1.4-F1.10	ABC	1-Feb-18
17	MM OM4	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	.1	F1	.11	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	.4	F1	.11	JPN-01A-R1FP1.1-F1.11/JPN-02A-R1FP1.4-F1.11	ABC	1-Feb-18
	MM OM4	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	.1	F1	.12	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	.4	F1	.12	JPN-01A-R1FP1.1-F1.12/JPN-02A-R1FP1.4-F1.12	ABC	1-Feb-18
19	MM OM5																					
20	SM OS2	Ţ																				
21														, and the second								

### APPENDIX A - PHSA COMMUNICATIONS STANDARD - SAMPLE DATABASE

	Α	В	С	D	E	F	G	Н	П	JK	L	М	N	0	Р	Q	R	S	Т	U	V	W
1	PHSA	- Ne	twork E	Edge																		
2	Inter-	Build	ing Fib	er Riser	Cable Information	on					SAN	IPLE DA	TA FORM	AT ONLY - PLEASE	DEL	ETE.	IT B	EFO	RE	ENTERING NEW DATA		
3																						
4		(	Origina	ting En	<b>dpoint-</b> (Main Eqւ	ıipm	ent l	₹00	m)		1	Termina	ating En	dpoint- (Main Equ	uipm	ent	Roc	m)				
5	Fiber Type	Floo r Cod e	m	Teleco m Room ID	Termination type	Rack ID	Patch Panel	Bay	Cable ID	Strand	Floor Code	Teleco m Room#	Telecom Room ID	Termination type	Rack ID	Patch Panel	Bay	Cable ID	Strand	Full Cable ID	Coy Name	Install Date
6	014.00	2 04	400	IDNI O4A	LO CO OT TANEEL	D4	ED4	_	F4	4	04	400	IDO 044	LO CO CT MTD	D4	ED4	_	F4	_	IDN 044 D45D4 4 54 4/IDO 044 D45D4 4 54 4	400	4.5-5.40
8	SM OS	2 01	123	JPN-01A	LC, SC, ST or MTRJ LC, SC, ST or MTRJ	R1	FP1	.1		.2	01	100 100	JPS-01A	LC, SC, ST or MTRJ	R1	FP1	.4	F1	.2	JPN-01A-R1FP1.1-F1.1/JPS-01A-R1FP1.4-F1.1 JPN-01A-R1FP1.1-F1.2/JPS-01A-R1FP1.4-F1.2	ABC	
	SM OS				LC, SC, ST or MTRJ LC, SC, ST or MTRJ					.3	01 01	100 100								JPN-01A-R1FP1.1-F1.3/JPS-01A-R1FP1.4-F1.3 JPN-01A-R1FP1.1-F1.4/JPS-01A-R1FP1.4-F1.4		1-Feb-18 1-Feb-18

Description	Comm. Room serving a wiring zone: 0 - 240 Drops	Comm. Room serving a wiring zone: 241- 480 Drops	Comm. Room serving a wiring zone: 481 - 960 Drops	Comm. Room serving a wiring zone: > 960 Drops
Input Power	Vital/Generator Power for all Acute Sites.	Vital/Generator Power for all Acute Sites.	Vital/Generator Power for all Acute Sites.	Vital/Generator Power for all Acute Sites.
	5-20RA (on Vital/Generator\receptacles mounted on the wall (305mm AFF) located every 1.8 m (6	5-20RA (on Vital/Generator) receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) aroun	d 5-20RA (on Vital/Generator) receptacles mounted on the wall (305mm AFF)	5-20RA (on Vital/Generator) receptacles mounted on the wall (305mm AFF)
Maintenance Receptacles	ft) around perimeter walls.	perimeter walls.	located every 1.8 m (6 ft) around perimeter walls.	located every 1.8 m (6 ft) around perimeter walls.
Equipment Rack	1 or 2	3	4	7
Equipment Rack Receptacles	One (1) rack scenario: Provide two (2) L6-30R receptacles, each on dedicated circuits above the rack, one (1) on Vital/Generator and one (1) on Utility Power. The Vital/Generator Power will be used to provide input power into the UPS, and the other will be used for a metered Power Distribution Unit.  Two (2) rack scenario: Rack 1 - Provide one (1) L6-30R receptacle, on dedicated circuits above the rack on Utility Power. The Utility Power will be used for a metered Power Distribution Unit.  Rack 2 - Provide two (2) L6-30R receptacles, each on dedicated circuits above the rack 2, one (1) on Vital/Generator and one (1) on Utility Power. The Vital/Generator Power will be used to provide input power into the UPS and the other will be used for a metered Power Distribution Unit.	Rack 1, 2 & 3 - Provide one (1) L6-30R receptacle per Rack 1, 2, & 3; on Utility Power. Utility Power will be used for a-metered Power Distribution Unit.	Rack 1, 2, 3 & 4 - Provide one (1) L6-30R receptacle per Rack 1, 2, 3 & 4; on Utility Power. The Utility Power will be used for a metered Power Distribution Unit.  Rack 1 - Provide one (1) L6-30R receptacle on Generator Power. The L6-30R will provide input power to the 6000VA UPS.	Rack 1, 2, 3, 4, 5, 6 & 7 - Provide one (1) L6-30R receptacle per Rack 1, 2, 3, 4. 5 6 & 7; on Utility Power. The Utility Power will be used for a metered Power Distribution Unit.  Rack 1 - Provide one (1) L6-30R receptacle on Vital/Generator Power. The L6-30R will provide input power to the 6000VA UPS.
UPS	Provide a rack mount 6000VA UPS in Rack 2 (refer to Appendix C for appropriate model number) c/w:  - L6-30P input cord (Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings for receptacle locations)  - 2 x L6-30R and 2 x L6-20R output receptacles  - Four post rack mount kit  - Temperature Probe  - Network Management Card	Provide a rack mount 8000VA UPS in Rack 2 (refer to Appendix C for appropriate model number) c/w  - Direct feed or hardwired connection to the UPS from Vital/Generator Power  - Three (3) L6-30R output receptacles  - Four post rack mount kit  - Temperature Probe  - Network Management Card	Provide a rack mount 11000VA UPS in Rack 3 (refer to Appendix C for appropriate model number) c/w  - Direct feed or hardwired connection to the UPS from Vital/Generator Power - Three (3) L6-30R output receptacles - Four post rack mount kit - Temperature Probe - Network Management Card  Provide a rack mount 6000VA UPS to distribute 208V UPS Power to third party equipment in Rack 1. Refer to Appendix C for appropriate model number.	Provide a rack mount 11000VA UPS in Rack 3 and Rack 6 (refer to Appendix C for appropriate model number) c/w  - Direct feed or hardwired connection to each 11000VA UPS from Vital/Generator Power  - Three (3) L6-30R output receptacles on each 11000VA UPS  - Four post rack mount kit  - Temperature Probe  - Network Management Card  Provide a rack mount 6000VA UPS to distribute 208V UPS Power to equipment in Rack 1. Refer to Appendix C for appropriate model number.
Extended Battery Modules	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required.  - Runtime when input power is on Vital/Generator power: 10 minutes  - Runtime when input power is utility: 30 minutes	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required.  - Runtime when input power is on Vital/Generator power: 10 minutes  - Runtime when input power is utility: 30 minutes	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required Runtime when input power is on Vital/Generator power: 10 minutes - Runtime when input power is utility: 30 minutes	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required Runtime when input power is on Vital/Generator power: 10 minutes - Runtime when input power is utility: 30 minutes
PDUs	Provide one basic and one monitored/metered Power Distribution Units per rack (refer to Appendix C for appropriate model number), c/w L6-30P input cords (10 feet).  - Zero U Power Distribution Units - Power Distribution Unit #1 (basic) plugs directly into the 6000VA UPS unit - Power Distribution Unit #2 (metered) plugs into the L6-30R receptacle located above the Rack - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.	Rack 1, 2 & 3 - Provide one basic and one monitored/metered Power Distribution Units per rack, c/w L6-30P input cords (10 feet)  - Zero U Power Distribution Units  - Power Distribution Unit #1 (basic) plugs directly into the 8000VA UPS unit  - Power Distribution Unit #2 (metered) plugs into the L6-30R receptacle located above the Rack  - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.	30P input cords (10 feet) Rack 1, 2, 3 & 4 - Provide one basic Power Distribution Units per rack, c/w L6-30f input cords (10 feet) - Zero U Power Distribution Units - Power Distribution Unit #1 (basic) plugs directly into the Rack 1 to 6000VA UPS	c/w L6-30P input cords (10 feet)  Rack 1, 2, 3, 4, 5, 6 & 7 - Provide one basic Power Distribution Units per rack, c/w L6-30P input cords (10 feet) - Zero U Power Distribution Units - Power Distribution Unit #1 (basic) plugs directly into the Rack 7 to 6000VA UP unit & Rack 1, 2, 3, 4, 5, & 6 to the 11000VA UPS units - Power Distribution Unit #2 (metered) plugs into the L6-30R receptacle located

# APPENDIX B - PHSA COMMUNICATIONS STANDARD - POWER DISTRIBUTION FOR ALL COMMUNICATIONS SPACES

Rack Mount UPS Power - New and	Evicting Community Sites			
Description	Comm. Room serving a wiring zone: 0-144 Drops	Comm. Room serving a wiring zone: 145-240 Drops	Comm. Room serving a wiring zone: 241-480 Drops	Comm. Room serving a wiring zone: 241-480 Drops
Input Power	Vital/Generator Power for all Sites. In sites that are not equipped with generator power, utility power is acceptable.	Vital/Generator Power for all Sites. In sites that are not equipped with generator power, utility power is acceptable.	Vital/Generator Power for all Sites. In sites that are not equipped with generator power, utility power is acceptable.	Vital/Generator Power for all Sites. In sites that are not equipped with generator power, utility power is acceptable.
Maintenance Receptacles	5-20RA utility power receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.	5-20RA utility power receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.	5-20RA-utility power receptacles mounted on the wall (305mm AFF) located ever 1.8 m (6 ft) around perimeter walls.	y 5-20RA-utility power receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.
Equipment Rack	1	2	3	4
Equipment Rack Receptacles	Provide two (2) L5-30R receptacles, each on dedicated circuits above the rack. One L5-30R is on Vital/Generator Power and the second L5-30R is on Utility Power. In sites that are not equipped with Vital/Generator power, Utility power is acceptable. The Vital/Generator Power will be used to provide input power into the UPS, and the other will be used for a metered Power Distribution Unit.	Rack 1 - Provide one (1) L6-30R receptacle on Utility Power.  Rack 2 - Provide two (2) L6-30R receptacles, each on dedicated circuits above the rack, one on Vital/Generato and one on Utility Power. Utility Power is acceptable where Vital/Generator is not available. The Vital/Generator Power will be used to provide input power into the UPS, and the other will be used for a metered Power Distribution Unit.	Rack 1, 2, & 3 - Provide one (1) L6-30R receptacle per Rack 1, 2, & 3; on Utility Power. The other Utility Power will be used for a metered Power Distribution Uni	Rack 1, 2, 3 & 4 - Provide one (1) L6-30R receptacle per Rack 1, 2, 3 & 4 on t. Utility Power. The other Utility Power will be used for a metered Power Distribution Unit.
UPS	Provide a rack mount 3000VA UPS (refer to Appendix C for appropriate model number) c/w:  - L5-30P input cord (Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings for receptacle locations)  - 2 x L5-30R output receptacles  - Four post rack mount kit  - Temperature Probe  - Network Management Card	Provide a rack mount 6000VA UPS in Rack 2 (refer to Appendix C for appropriate model number) c/w:  - L6-30P input cord (Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings for receptacle locations)  - 2 x L6-30R and 2 x L6-20R output receptacles  - Four post rack mount kit  - Temperature Probe  - Network Management Card	Provide a rack mount 8000VA UPS in Rack 2 (refer to Appendix C for appropriate model number) c/w  - Direct feed or hardwired connection to the UPS from Vital/Generator Power or Utility power when Vital/Generator Power is not available.  - Three (3) L6-30R output receptacles  - Four post rack mount kit  - Temperature Probe  - Network Management Card	Provide a rack mount 8000VA UPS in Rack 3 (refer to Appendix C for appropriate model number) c/w  - Direct feed or hardwired connection to the UPS from Vital/Generator Power o Utility power when Vital/Generator Power is not available Three (3) L6-30R output receptacles  - Four post rack mount kit  - Temperature Probe  - Network Management Card
	Technolik Management card	* If 1500VA UPS system is required to distribute 120V UPS-Power to the third party equipment in the rack refer to Appendix C for appropriate model number.	* If 3000VA UPS system is required to distribute 120V UPS Power to third party equipment in the rack refer to Appendix C for appropriate model number.	* If 3000VA UPS system is required to distribute 120V UPS Power to third party equipment in the rack refer to Appendix C for appropriate model number.
Extended Battery Modules	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required Runtime when input power is on Vital/Generator Power power: 10 minutes - Runtime when input power is utility: 30 minutes	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required.  - Runtime when input power is on Vital/Generator Power power: 10 minutes  - Runtime when input power is utility: 30 minutes	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required Runtime when input power is on Vital/Generator Power power: 10 minutes - Runtime when input power is utility: 30 minutes	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required Runtime when input power is on Vital/Generator Power power: 10 minutes - Runtime when input power is utility: 30 minutes
PDUs	Provide one basic and one monitored/metered Power Distribution Units (refer to Appendix C for appropriate model number), c/w L5-30P input cords (10 feet)  - Zero U Power Distribution Units - Power Distribution Unit #1 (basic) plugs directly into the 3000VA UPS unit - Power Distribution Unit #2 (metered) plugs into the L5-30R receptacle located above the Rack - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.	Provide one basic and one monitored/metered Power Distribution Units (refer to Appendix C for appropriate model number), c/w L6-30P input cords (10 feet)  - Zero U Power Distribution Units  - Power Distribution Unit #1 (basic) plugs directly into the 6000VA UPS unit  - Power Distribution Unit #2 (metered) plugs into the L6-30R receptacle located above the Rack  - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.	30P input cords (10 feet) Rack 1, 2 & 3 - Provide one basic Power Distribution Units per rack, c/w L6-30P input cords (10 feet) - Zero U Power Distribution Units	Rack 1, 2, 3 & 4 - Provide one metered Power Distribution Units per rack, c/w L6 30P input cords (10 feet) Rack 2, 3 & 4 - Provide one basic Power Distribution Units per rack, c/w L6-30P input cords (10 feet)  - Zero U Power Distribution Units - Power Distribution Unit #1 (basic) plugs directly into the 8000VA UPS unit - Power Distribution Unit #2 (metered) plugs into the L6-30R receptacle located
			above the Rack - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.	above the Rack

Centralized Network (IMIT) Dedic	ated UPS Power - New Acute Sites and Existing Acute Sites (undergoing major power retrofit)
Description	Comm. Room
Input Power	Input 1: Generator Power for maintenance receptacles and back-up power to equipment racks The electrical distribution panel for generator protected power is located inside the Communication Room. Input 2: Centralized Network Dedicated UPS power for equipment racks. The distribution panel for this source is located in the TR/MER/EF room.
Maintenance Receptacles	5-20RA (on gen. protected power) receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.
Equipment Rack	4 - 7 (TRs, MERs and MC Rooms)
Equipment Rack Receptacles	Vendor or Third Party Equipment Rack - Provide two (2) L21-30R receptacles, each on dedicated circuits above the rack on one (1) on Centralized Network Dedicated UPS power and one (1) on Vital Power.  Health Authority Equipment Racks - Provide two (2) L21-30R receptacles, each on dedicated circuits above each rack; one (1) on Centralized Network Dedicated UPS power and one (1) on Vital Power. Provide the Power Distribution Unit in the centre of line-up with a temperature probe. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.
UPS	Centralized Network Dedicated N+1 UPS and Distribution System: The Design and Construction of all aspects of the electrical distribution (including IMIT UPS frame sizing) to the Communications rooms EF, TR, AHER & MER will accommodate 8kW per equipment rack and or cabinet.  Based on the PHSA minimum standards for Communications room sizing and rack/cabinet count. This includes all distribution panels, distribution breakers and cables servicing the Comm rooms and the main N+1 UPS distribution frame.  Input power source for a centralized network dedicated UPS is always Generator Power.
External Wrap Around Bypass	Yes
Power Distribution Units	Health Authority Equipment Racks - Provide two monitored/metered Power Distribution Units, c/w L21-30P input cords (10 feet) per rack. Equip onen Power Distribution Unit in the centre of line-up with a temperature probe. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards (refer to Appendix C for appropriate model number).

Rack and Tower formate Part Number	Description	Input	Output 1	Output 2	Battery Runtime	Ext. Bypass	Input Cord	SNMP
Tarenamber	Description	mput	Output 1	Output 2	approximate. Depends on load power factor	Ext. Dypuss	input coru	Web Card
9PX1500RTN-L	Eaton 9PX lithium Ion	120V 5-15P	120V (8) 5-15R		5 minutes	Optional	8 foot	Included
9PXEBM48RT-L	1.5kva / 1.35kw Eaton 9PX lithium Ion							
	1.5kva Battery							
P022-006	Tripp Lite Power Extension Cord, NEMA 5-15P to NEMA 5-15R						6 foot	
9PX2000RTN-L	Eaton 9PX lithium Ion 2kva / 1.8kw	120V 5-20P	120V (6) 5-20R	120V (1) L5-20R			8 foot	
9PXEBM72RT-L	Eaton 9PX lithium Ion 3kva Battery							
PWC-129-01	L5-20P to 5-20R power cable 12AWG - to permit connection to an L5-20R						1 foot	
9PX3000RTN-L	Eaton 9PX lithium Ion 3kva / 2.7kw	120V L5-30P	120V (6) 5-15R	120V (1) L5-30R	5 minutes	Optional	8 foot	Included
9PXEBM72RT-L	Eaton 9PX lithium Ion 3kva							
P046-010-LL-30A	Battery Tripp Lite Power Extension Cord, NEMA L5-30P to NEMA L5-30R						10 foot	
9PX6K-10	Eaton 9PX 6kva / 5.4kw	208V L6-30P	208V (2)L6-30R	208V (2)L6-20R,	5 minutes	Optional	10 foot	Included
9PXEBM180RT EBMCBL180	Eaton 9PX 5/6kva Battery 6ft DC EBM extension							
P041-008	cable Tripp Lite Power Extension				1		8 foot	
P041-008	Cord, L6-30P to NEMA L6-30R						8 foot	
9PX8K	8kva / 7.2kw	208V: Hardwired	208V Hardwired & (3)L6-30R		6 minutes	Included	Hardwire	Included
9PX11K	11kva / 10kw	208V: Hardwired	208V Hardwired & (3)L6-30R		3 minutes	Included	Hardwire	Included
9PXEBM240RT	External Battery				+1 EBM = 16 min +2 EBM = 26 min +3 EBM = 38 min			
EBMCBL240	6ft DC EBM extension cable							
EMPDT1H1C2	Temp&Hum Probe	connects to SNMP card						
Rack and Tower forma	at Power Distribution Unit's (A	All Cord Ends Must	Be Molded)					
Part Number	Description		Basic	Monitored	Input	Output 1	Output 2	Input Cord
Unamanaged Power D	Distribution Unit's			1				
Horizontal PDU's								
EPBZ83	EPDU BI 12A EPDU BI 16A	1U 1U	Basic		120V 5-15P 120V 5-20P	120V (12) 5-15R		15 foot 10 foot
EPBZ85 EPBZ82	EPDU BI 16A EPDU BI 20A	1U	Basic Basic		120V 5-20P	120V (12) 5-20R 120V (12) 5-20R		15 foot
EPBZ84	EPDU BI 30A	1U	Basic		120V L5-30P	120V (10) 5-20R		10 foot
EPBZ79 Vertical PDU's	EPDU BI 30A	1U	Basic		208V L6-30P	208V (16) C13 (4) C19		15 foot
EPBZ75	EPDU BI 12A	Zero U	Basic		120V 5-15P	120V (14) 5-15R		15 foot
EPBZ77	EPDU BI 16A	Zero U	Basic		120V L5-20P	120V 5-20R (24)		10 foot
EPBZ90	EPDU BI 24A	Zero U	Basic	1	(c\w 5-20P adapter) 120V L5-30P	120V 5-20R (30)	+	10 foot
EPBZ80	EPDU BI 24A	Zero U	Basic		208V L6-30P	208V (36) C13 (6) C19		10 foot
Metered Power Distri	bution Unit's							
	Distribution Unit's							
EMIT00-10	EPDU MI 15A	10		Metered	120V 5-15P	120V (12) 5-15R		10 foot
EMIT01-10 EMIT02-10	EPDU MI 16A EPDU MI 20A	1U 1U		Metered Metered	120V 5-20P 120V L5-20P	120V (12) 5-20R 120V (12) 5-20R		10 foot 10 foot
EMIT03-10	EPDU MI 30A	1U		Metered	120V L5-20P	120V (12) 5-20R 120V (12) 5-20R		10 foot
EMIT07-10	EPDU MI 30A	1U		Metered	208V L6-30P	208V (18) C13		10 foot
Vertical Power Di		71'			1201/5 152	1201//12/5 155		10.5
EMI100-10	EPDU BI 12A EPDU MI 16A	Zero U Zero U		Metered	120V 5-15P 120V L5-20P	120V (12) 5-15R 120V 5-20R (24)		10 foot 10 foot
EMI101-10					(c\w 5-20P adapter)			
		Zero U		Metered	120V L5-30P	120V 5-20R (30)		10 foot
EMI102-10	EPDU MI 24A				1:100V/1C 20D	208V (36) C13 (6) C19		10 foot
EMI102-10 EMI104-10	EPDU MI 24A	Zero U	nds Must Re Maldet	Metered	208V L6-30P	2087 (30) C13 (0) C13		
EMI102-10 EMI104-10		Zero U	nds Must Be Molded)		208V L6-30P	2087 (30) C13 (0) C13		
EMI102-10 EMI104-10 Rack Power Distributi	EPDU MI 24A	Zero U	nds Must Be Molded)		Input	Output 1	Output 2	
Part Number  Vertical Power Di	EPDU MI 24A ion Unit's for Centralized UPS  Description stribution Unit's	Zero U System (All Cord E	nds Must Be Molded	Monitored	Input	Output 1	Output 2	
EMI102-10 EMI104-10 Rack Power Distributi	EPDU MI 24A ion Unit's for Centralized UPS  Description	Zero U	nds Must Be Molded)				Output 2	10 foot
EMI102-10 EMI104-10 Rack Power Distributi Part Number  Vertical Power Di	EPDU MI 24A ion Unit's for Centralized UPS  Description  stribution Unit's  G3 Metered PDU	Zero U System (All Cord E Zero U		Monitored  Metered	Input 120-208V L21-30P 3PH	Output 1 120V (6) 5-20R 208V (24) C13 (3) C19	Output 2	











Facilities Management – Facilities Systems & Support (FSS) Facilities Space Information & Drawing Services

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Revised February 2020





# APPENDIX E.1: BELDEN COPPER & FIBER STRUCTURED CABLING SYSTEMS PART NUMBERS

Version 01 February 2022

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16.1.	1m (3') FP5LDLD001M10
16.2.	1.5 m (5') FP5LDLD01M510
16.3.	2.1 m (7'), mostly FP5LDLD02M110
16.4.	3m (10'), mostly FP5LDLD003M10
16.5.	4.6m (15') FP5LDLD04M610
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17.1.	1.5m (5') FPSLDLD01M510
17.2.	2.1 m (7'), mostly FPSLDLD02M110
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17.5.	6.1m (20') FPSLDLD06M111
18. F	iberExpress Fusion Splice-on Connectors
18.1.	FX Fusion Multimode Connectors
18.1.1.	OM5 LC Simplex 900 µm Tight Buffer, 1/Pack – Lime Green FT5LC900FS0111
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# 1. Purpose

The purpose of this list of Belden parts is to ensure all PHSA pre-approved Div.27 contractors provide the same products for healthcare facilities in BC when installing Belden structured cabling system solution and following the requirements of the latest PHSA Communications Infrastructure Standards & Specifications. If you are unable to provide the listed parts for your specific project, you must defer to PHSA for guidance.

# 2. Rack & Bottom Shelf

- 2.1. 4-post Seismic Adjustable Rack XDRS8419-610S02
- 2.2. Solid Rack Mount Shelf, 9010-1919-S01
- 2.3. Wall-mount Equipment Rack XWR2019HD-S01ST

# 3. Cabinet

- 3.1. Seismic Cabinet XHSS453642-S01 Rev0
- 3.2. Wall-mount Enclosure XWM243031-S01 REV.4

# 4. Cable Manager

- 4.1. 6" wide Double-sided Vertical Manager BHVHH06
- 4.2. 12" wide Double-sided Vertical Manager BHVHH12
- 4.3. Vertical Manager Back Cover BHBC12X
- 4.4. 2U Horizontal Cable Manager BHH192UR

# 5. Faceplate

- 5.1. KeyConnect Faceplates 4-Port w/ID Windows Single-Gang AX102249
- 5.2. MDVO Interface Plates 4 Port Single Gang Flush AX101437
  - 5.2.1. To match existing installations and is limited to moves, adds and changes
- 5.3. Wall Mount Phone Plate Recessed 1-Port AX104126
- 5.4. KeyConnect Modular Furniture Faceplate; 4-port, with ID Windows, Single Gang AX103926
- 5.5. KeyConnect 2-port Side Entry Box without Shutter Door AX105353-EW

# 6. Jack

6.1.	O 4 TO 4	DEV.0 .		
กา	(:Δ16Δ	REVConnect	IACK RVAIV	1 IKT IYY-S1

- 6.1.1. New installation
- 6.1.2. REVConnect jack works only with Wiremold V6000 longer than KeyConnect jack
- 6.2. CAT6A KeyConnect Jack AX102283
  - 6.2.1. Match existing installation
- 6.3. CAT6 REVConnect Jack RV6MJKUBK
  - 6.3.1. New installation
  - 6.3.2. REVConnect jack works only with Wiremold V6000 longer than KeyConnect jack
- 6.4. CAT6 MDVO Jack AX101066
  - 6.4.1. Match existing installation
- 6.5. CAT6 KeyConnect Jack AX101321
  - 6.5.1. Match existing installation

# 7. UTP Patch Panel

- 7.1. CAT6A Patch Panel
  - 7.1.1. 10GX REVConnect Patch Panel, 24-Port, Flat 1U (Preloaded Discreet Jacks) RVAPPF1U24BK-P
  - 7.1.2. 10GX REVConnect Patch Panel, 48-Port, Flat 2U (Preloaded Discreet Jacks) RVAPPF2U48BK-P
- 7.2. CAT6 Patch Panel
  - 7.2.1. 24-Port, Flat 1U (Preloaded Discreet Jacks) RV6PPF1U24BK-P
  - 7.2.2. 48-Port, Flat 2U (Preloaded Discreet Jacks) RV6PPF2U48BK-P

# 8. Horizontal Cable

- 8.1. CAT6A 10GXS (small diameter), Blue: 10GXS13 CMP
- 8.2. CAT6A 10GXS (small diameter), Blue: 10GXS12 CMR
- 8.3. CAT6, Blue: 2413 CMP
- 8.4. CAT6, Blue: 2412 CMR

# 9. Backbone Cable

- 9.1. CAT3 25-Pair DIW25 CMR
- 9.2. CAT3 25-Pair DPLN25 CMP
- 9.3. CAT3 50-Pair DIW50 CMR
- 9.4. CAT3 50-Pair DPLN50 CMP
- 9.5. CAT3 100-Pair DIW100 CMR
- 9.6. CAT3 100-Pair DPLN100 CMP
- 9.7. CAT3 200-Pair DIW200 CMR
- 9.8. CAT3 200-Pair DPLN200 CMP

# 10. UTP Patch Cord

- 10.1. CAT6A Patch Cord
  - 10.1.1. 12" 28 AWG Stranded (small diameter) CAD1108001
  - 10.1.2. 1.2m (4') (small diameter) CAD1108004
  - 10.1.3. 2.1m (7') (small diameter) CAD1108007
  - 10.1.4. 3m (10') (small diameter) CAD1108010
  - 10.1.5. 3m (10') for Workstations CA21108010
  - 10.1.6. 7.6m (25') for Wireless Access Point CA21108025
  - 10.1.7. 9.1m (30') for Wireless Access Point CA21108030
- 10.2. CAT6 Patch Cord
  - 10.2.1. 12" (small diameter) C6D1108001
  - 10.2.2. 1.2m (4') (small diameter) C6D1108004
  - 10.2.3. 2.1m (7') (small diameter) C6D1108007
  - 10.2.4. 3m (10') (small diameter) C6D1108010
  - 10.2.5. 3m (10') for Workstations C601108010
  - 10.2.6. 7.6m (25') for Wireless Access Point C601108025
  - 10.2.7. 9.1m (30') for Wireless Access Point C601108030

# 11. GigaBix:

11.	1	GigaBIX Termination Kit, 300-pair AX1014	171
	1.	Jigabix Terriniation Ixit, 500-pail / 1/10 1-	T / I

- 11.2. GigaBIX Mount AX101472
- 11.3. GigaBIX Cable Management Module AX101469
- 11.4. GigaBIX Connector, 6-port AX101447
- 11.5. GigaBIX Connector, 25-Pair AX101448
- 11.6. GigaBIX Wire Guard AX101486
- 11.7. GigaBIX Designation Strip AX101483
- 11.8. GigaBIX Management Ring AX101478
- 11.9. GigaBIX Management Ring Spacer AX102190
- 11.10. GigaBIX Termination Bar AX101719
- 11.11. GigaBIX Color-coded Clip (Red) AX102151

# 12. FiberExpress Ultra High Density Patch Panels

- 12.1. FX UHD Patch Panel 4U (PX105678) AX104683
- 12.2. FX UHD Patch Panel 2U AX104682
- 12.3. FX UHD Patch Panel 1U (PX105677) AX104681

# 13. Fiber Splicing Cassette

- 13.1. FX UHD Splicing Cassette FC5H12LDFS
  - 13.1.1. FX UHD Cassette, OM5, 12 Ports, Splicing, LC Duplex, Lime Green Adapters
- 13.2. FX UHD Splicing Cassette FCSH12LDFS
  - 13.2.1. FX UHD Cassette, OS2, 12 Ports, Splicing, LC Duplex, Blue Adapters

# 14. Fiber Frame and Fiber Management

- 14.1. FX UHD Management Spool AX105700
  - 14.1.1. Cables with higher fiber count

# 15. Armoured Fiber Cables

15.1.	OS2 li	ndoor/Outdoor Plenum Distribution Tight Buffer
	15.1.1.	24 strands OS2 Fiber Distribution Plenum Indoor/Outdoor FDSD024A9Y
	15.1.2.	12 strands OS2 Fiber Distribution Plenum Indoor/Outdoor FDSD012A9Y
15.2.	OS2 li	ndoor Plenum Distribution Tight Buffer
	15.2.1.	24 strands OS2 Fiber Distribution Plenum Indoor FISD024A9
	15.2.2.	12 strands OS2 Fiber Distribution Plenum Indoor FISD012A9
15.3.	OM5 I	Indoor/Outdoor Plenum Distribution Tight Buffer
	15.3.1.	24 strands OM5 Fiber OFCP Aluminum Interlocked Armor Non-Unitized Lime Green Jacket FD5D024A9L
	15.3.2.	12 strands OM5 Fiber OFCP Aluminum Interlocked Armor Non-Unitized Lime Green Jacket FD5D012A9L
15.4.	OM5 I	Indoor Plenum Distribution Tight Buffer
	15.4.1.	24 strands OM5 Fiber OFCP Aluminum Interlocked Armor Non-Unitized Lime Green Jacket FI5D024A9
	15.4.2.	12 strands OM5 Fiber OFCP Aluminum Interlocked Armor Non-Unitized LIME Green Jacket FI5D012A9
	-	ess patch cord OM5, LC/LC Duplex, OFNR, Duplex ZIP -TO-B, Lime Green Jacket:
16.1.	1m (3	) FP5LDLD001M
16.2.	1.5 m	(5') FP5LDLD01M5
16.3.	2.1 m	(7'), mostly FP5LDLD02M1
16.4.	3m (1	0'), mostly FP5LDLD003M
16.5.	4.6m	(15') FP5LDLD04M6
16.6.	6.1m	(20') FP5LDLD06M1
17. F	iber patc	ch cord OS2, LC/LC Duplex:
17.1.	1.5m	(5') FPSLDLD01M5
17.2.	2.1 m	(7'), mostly FPSLDLD02M1
17.3.	3m (1	0'), mostly FPSLDLD003M

- 17.4. 4.6m (15') FPSLDLD04M6
- 17.5. 6.1m (20') FPSLDLD06M1

# 18. FiberExpress Fusion Splice-on Connectors

- 18.1. FX Fusion Multimode Connectors
  - 18.1.1. OM5 LC Simplex 900 µm Tight Buffer, 1/Pack Lime Green FT5LC900FS01
  - 18.1.2. OM5 SC Simplex 900 µm Tight Buffer, 1/Pack Lime Green FT5SC900FS01
- 18.2. FX Fusion Singlemode Connectors
  - 18.2.1. OS2 LC Simplex 900 µm Tight Buffer, 1/Pack Blue FTSLC900FS01
  - 18.2.2. OS2 SC Simplex 900 µm Tight Buffer, 1/Pack Blue FTSSC900FS01

### 19. MPO Cassette

- 19.1. MPO low loss OS2 Standard Cassette, LC/LC Duplex FC4U06LDMF
- 19.2. MPO low loss OS2 Alternate Cassette, LC/LC Duplex FCSU06LDMF1B
- 19.3. MPO low loss OM5 Standard Cassette, LC/LC Duplex FC5U06LDMF
- 19.4. MPO low loss OM5 Alternate Cassette, LC/LC Duplex FC5U06LDMF1L
- 19.5. MPO low loss OM5 Optimizer Cassette, LC/LC Duplex FC5U034MMF

# 20. Pre-terminated Fiber Trunk Cable

- 20.1. Pre-terminated OM5 Trunk Cable FM5MMB1xxxM
- 20.2. Pre-terminated OS2 Trunk Cable FMSMMB1xxxM

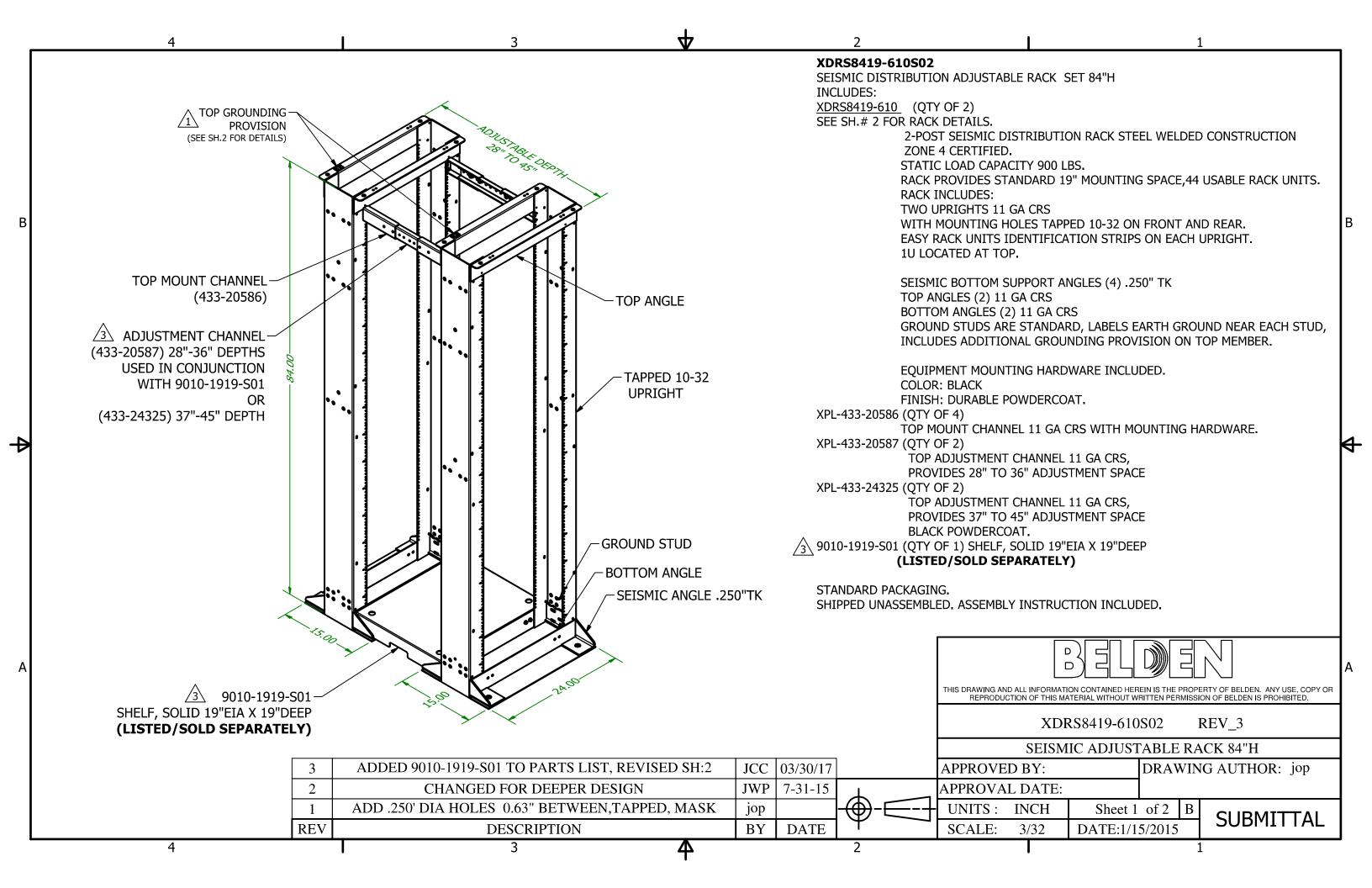
### 21. Pre-terminated UTP Trunk Cable

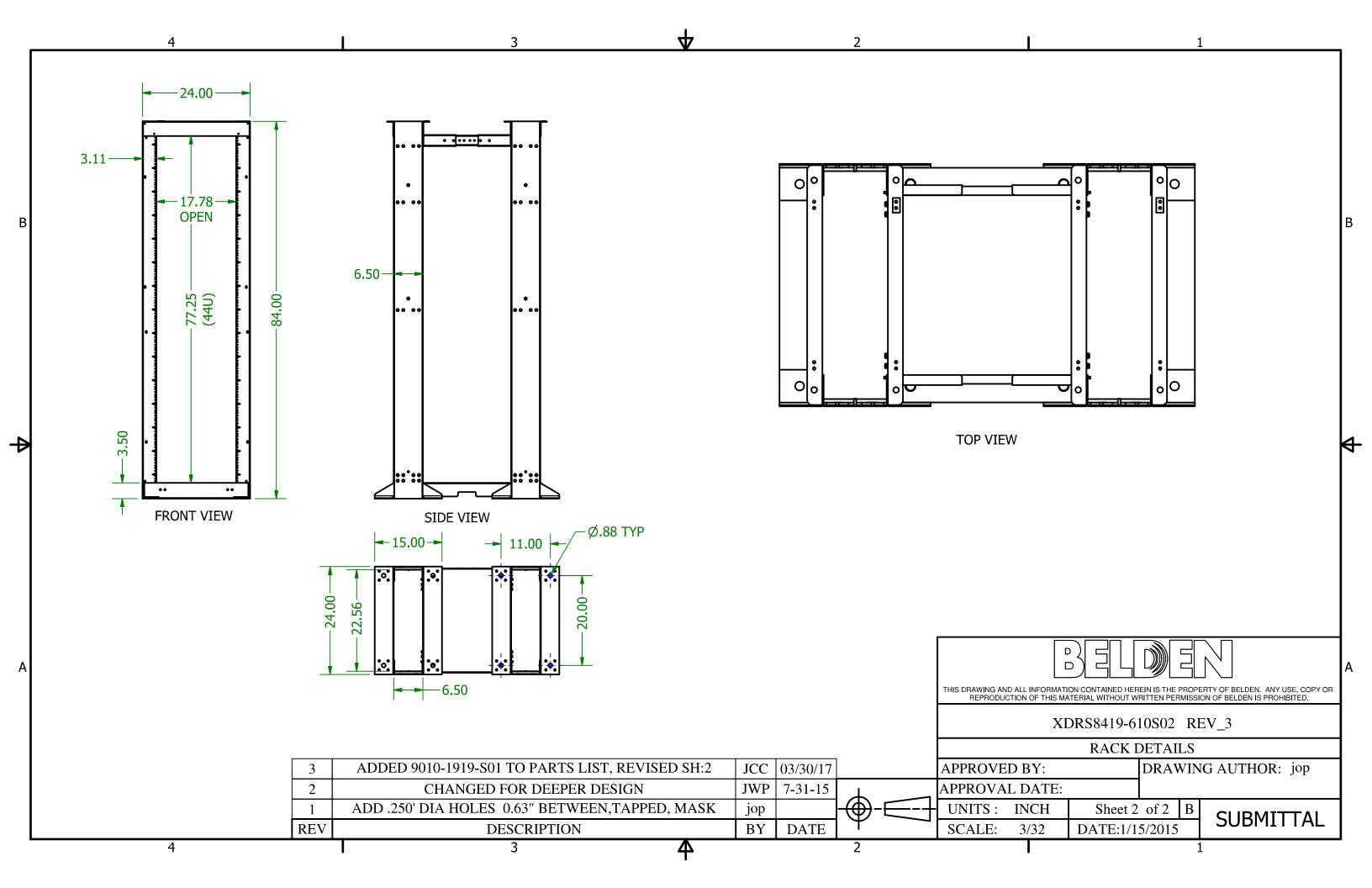
- 21.1. CAT6A Pre-terminated Cable Assembly CA211xx000A06
- 21.2. CAT6 Pre-terminated Cable Assembly C6011xx000A06

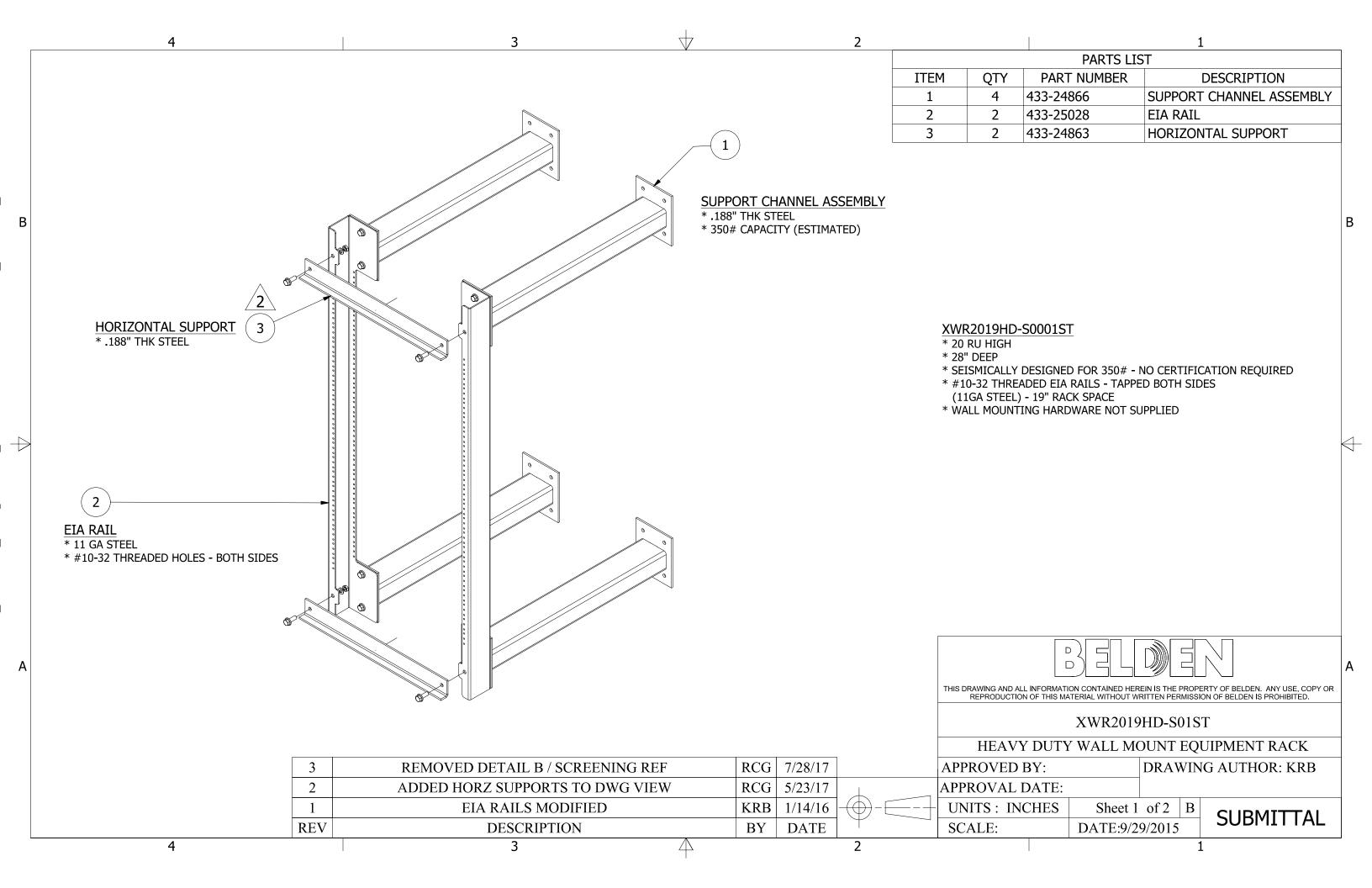
# 22. Pre-terminated UTP Patch Panel

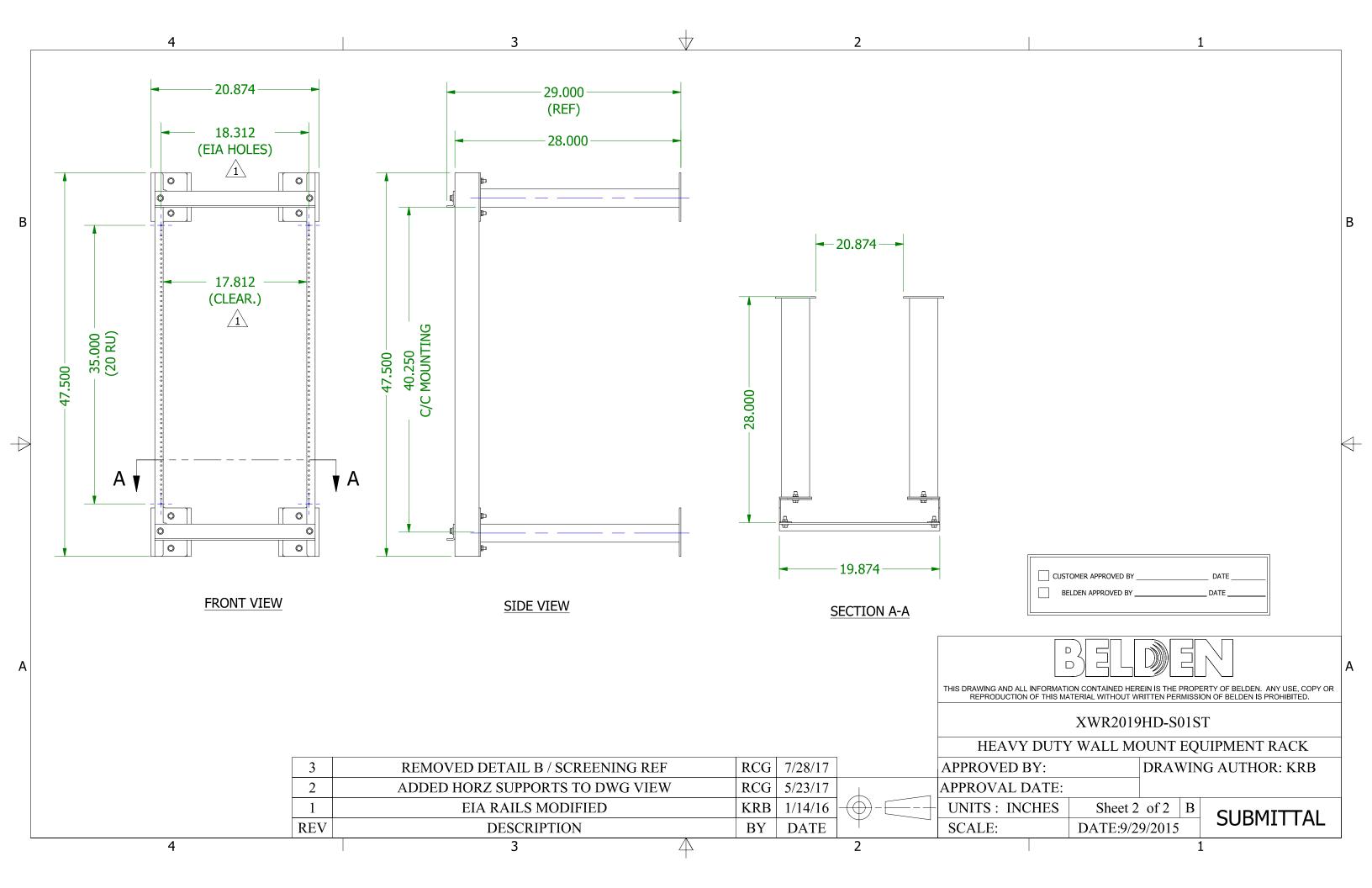
- 22.1. KeyConnect Patch Panel, 48-port, 1U, with 10GX RJ45 Coupler, Black AX104592
- 22.2. KeyConnect Patch Panel, 48-port, 1U, with CAT6+ RJ45 Coupler, Black AX104591

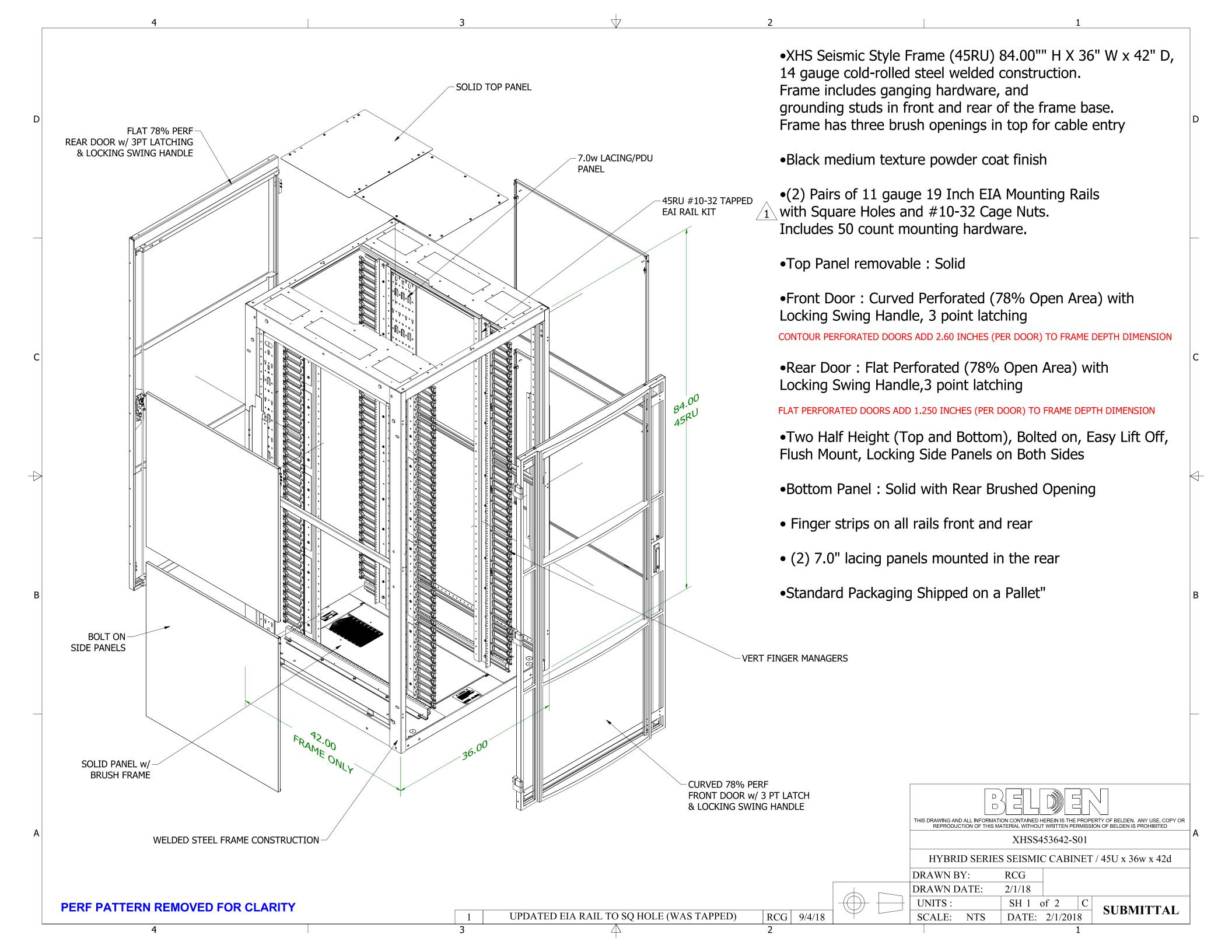
# 23. Belden Product Data Sheets

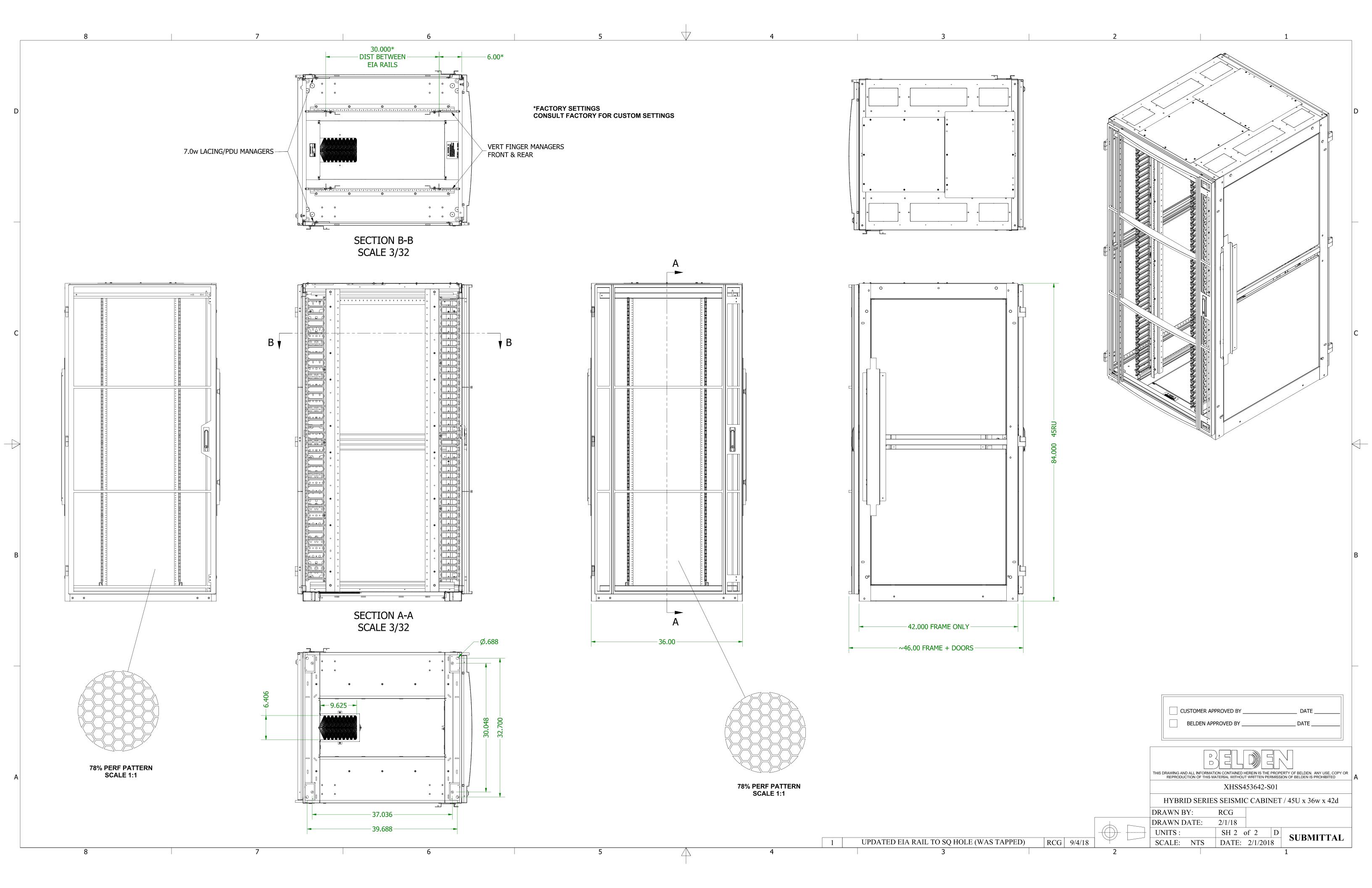


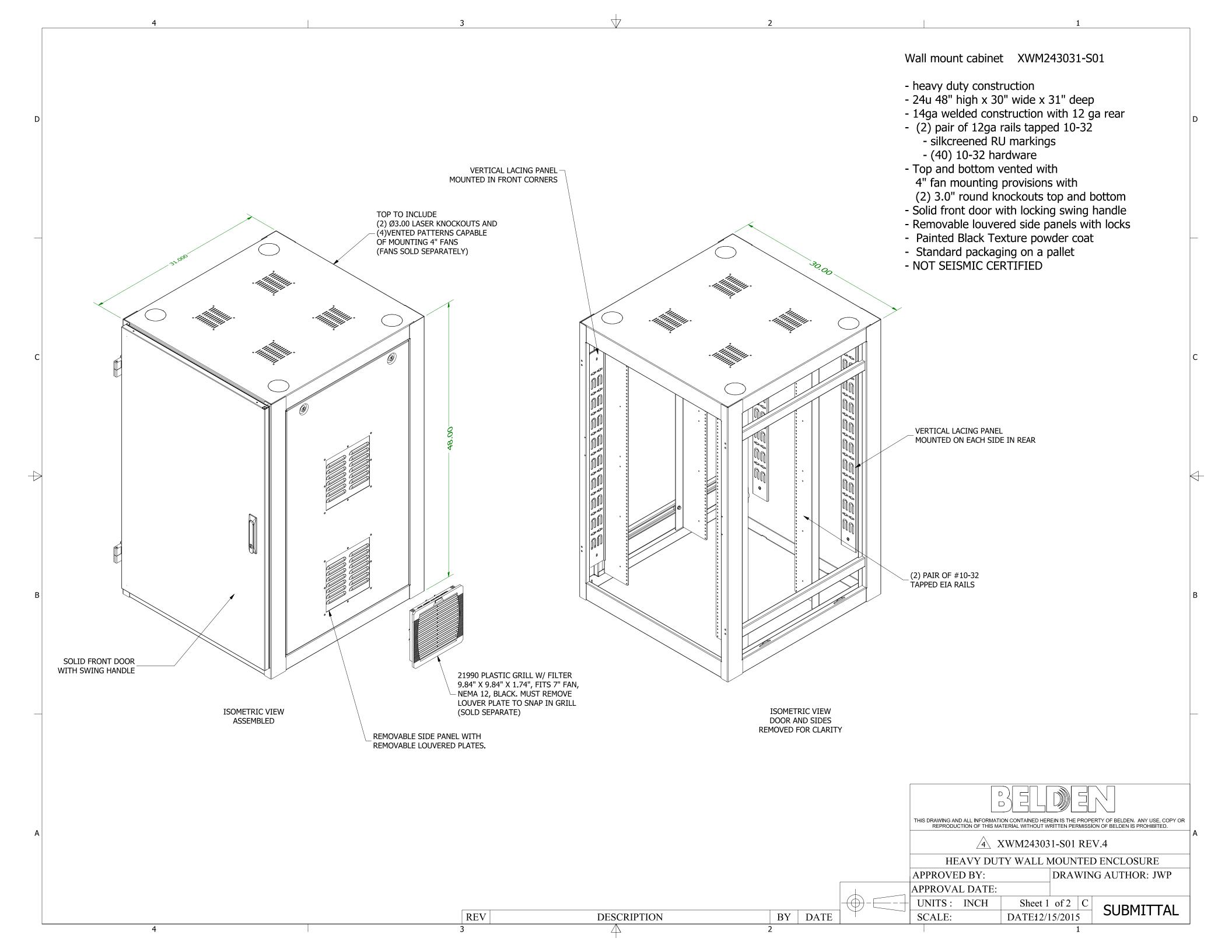


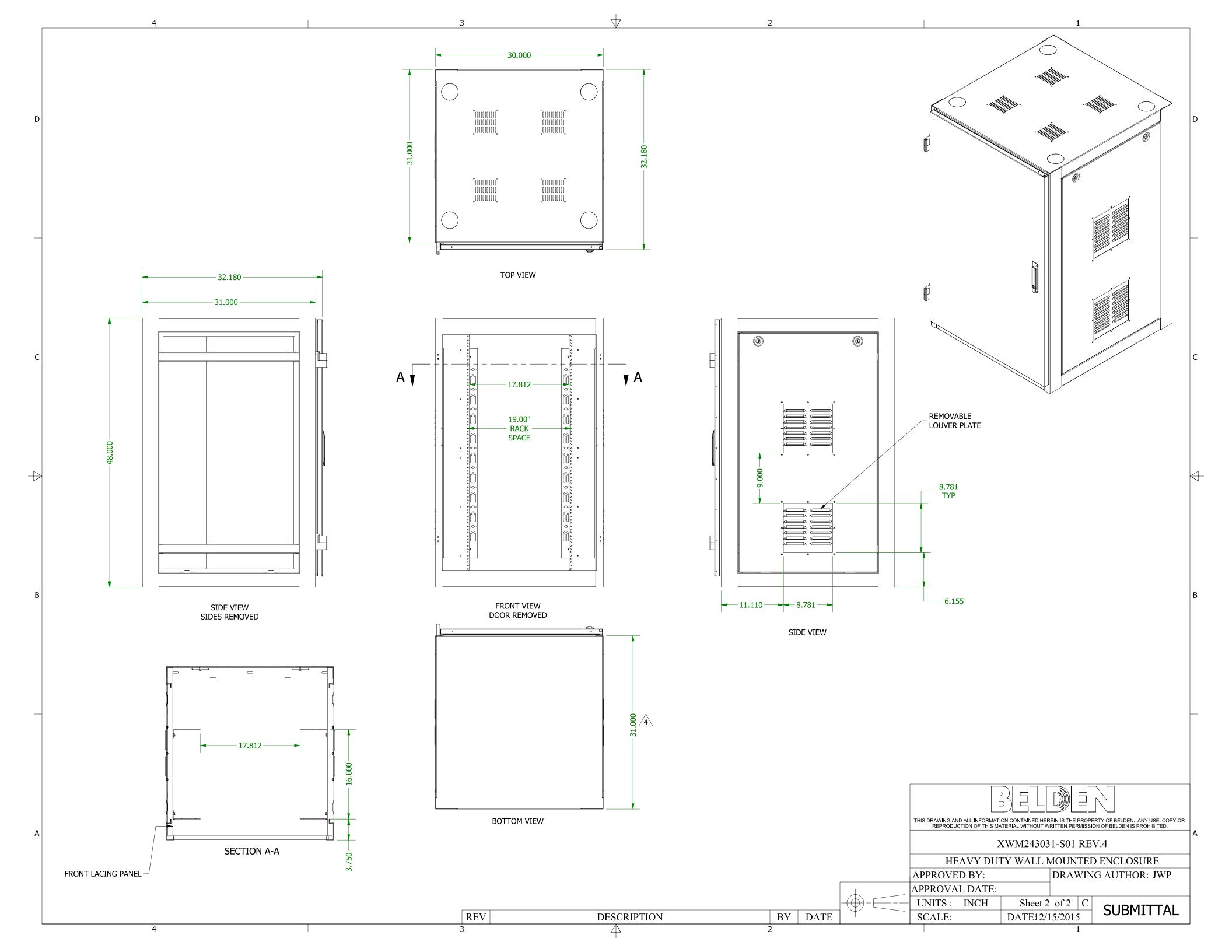












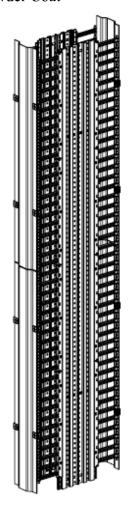
- □ Provides Vertical Cable Management between equipment racks.
- □ Double sided
- □ Material:

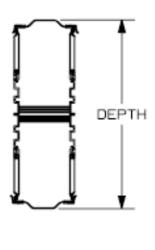
6063 – T6 Aluminum

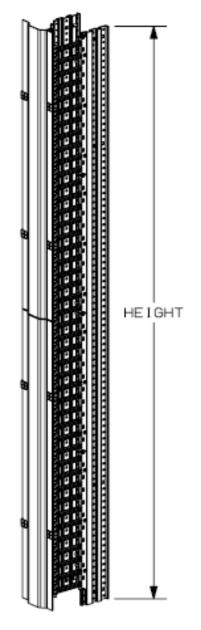
**Black Plastic** 

□ Finish:

Black Powder Coat







PART NUMBER	HEIGHT	WIDTH	DEPTH
BHVHH03	79.63	3.63	18.62
BHVHH06	79.63	6.00	18.62
BHVHH10	79.63	10.00	18.62
BHVHH12	79.63	12.00	18.62

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BHVHH HIGH DENSITY SERIES
DOUBLE SIDED
VERTICAL CABLE MANAGERS
TECHNICAL SPECIFICATION

Provides closure on the rear side of vertical cable managers

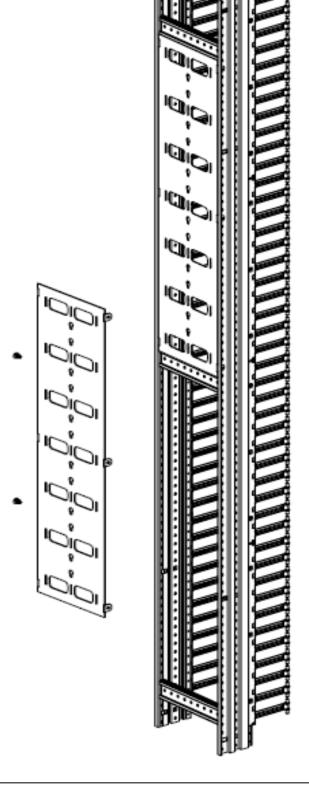
- □ Designed with pass thru openings for cable routing, slots for cable straps and keyhole slots for attaching cable spools
- □ Material:

Aluminum

□ Finish:

Black Powder Coat

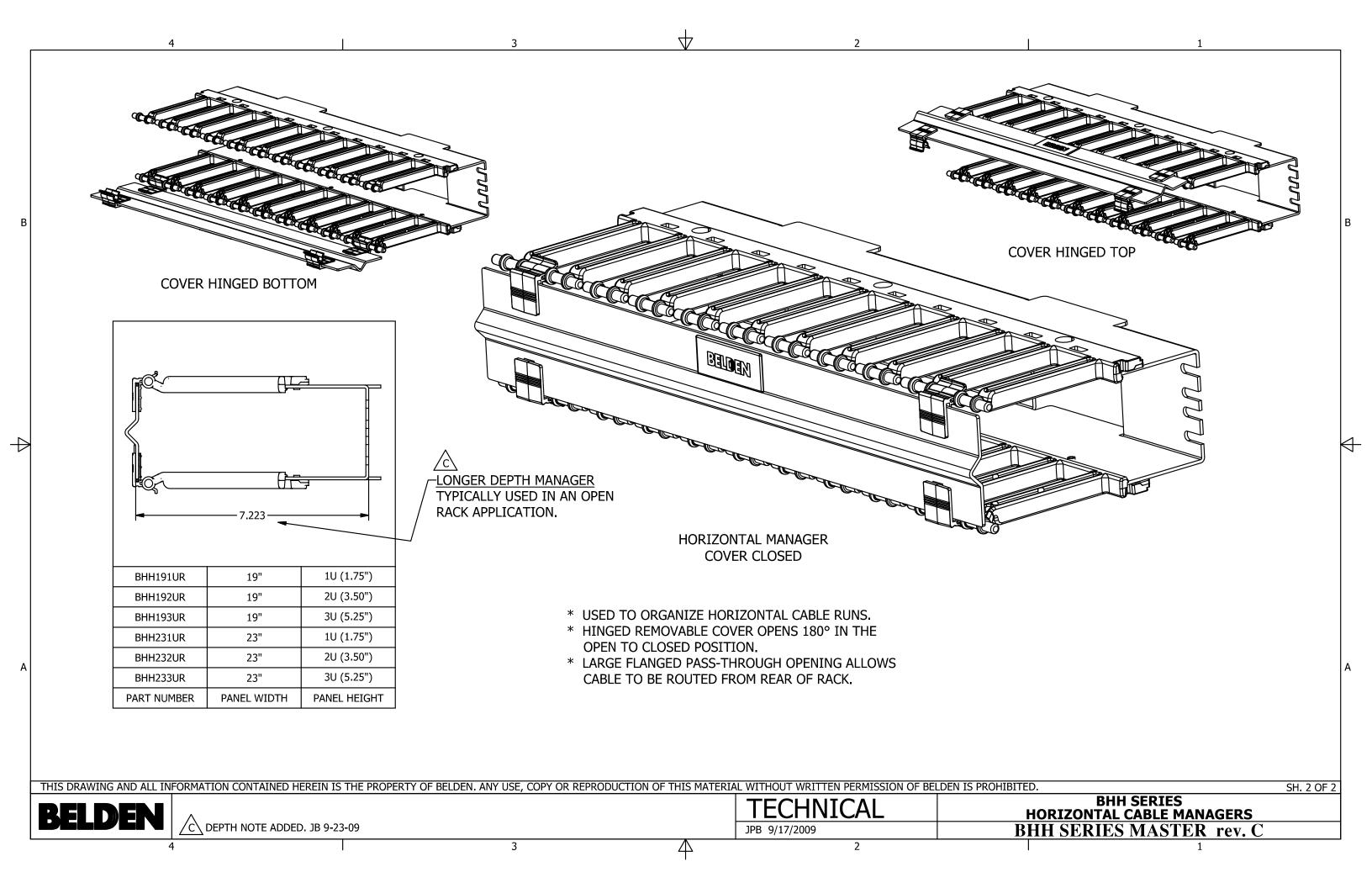
PART NUMBER	MANAGER
PARI NUMBER	WIDTH
BHBC03X	3.63"
BHBC06X	6.00"
BHBC10X	10.00"
BHBC12X	12.00"



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BHBC SERIES VERTICAL MANAGER BACK COVERS TECHNICAL SPECIFICATION



### **METRIC MEASUREMENT VERSION**



# AX102249 Faceplates and Panels - KeyConnect Faceplates 4-Port w/ID Windows Single-Gang



Product Family Part Numbers:





For more Information please call

1-800-Belden1



### **General Description:** KeyConnect Faceplates 4-Port, w/ ID Windows, Single Gang, Flush Usage (Overall) Suitable Applications: - Compatible with a variety of modules that are suitable for use with Belden IBDN Systems 10GX, 4800, 3600, 2400, 1200, Fiber and Coax. Related Parts: Compatible with KeyConnect-style Modular Jacks 10GX, CAT6+, CAT5E and Coax and Fiber inserts. Physical Characteristics (Connectivity) Capacity Max. Capacity: 4 ports Access Front Connection: Recessed **Dimensions** Dimensions: Height (mm) Width (mm) Depth (mm) 69.850 114.300 6.604 Materials Materials: **Description Material** Plate Plastic - UL94V-0 Color Elec. White Color: Weight Weight: 0.027 kg **Included Parts** Included Parts: 6-32 screws, carton labels, clear windows, KeyConnect blank inserts. Packaging Packaging: Individually packaged in a suitable plastic bag **Mechanical Characteristics (Connectivity)** Storage Temperature Range: -40°C To +70°C Installation Temperature Range: -10°C To +60°C Operating Temperature Range: -10°C To +60°C Applicable Specifications and Agency Compliance (Overall) **Applicable Standards & Environmental Programs** EU Directive 2002/95/EC (RoHS): Yes EU RoHS Compliance Date (mm/dd/yyyy): 07/01/2006 MII Order #39 (China RoHS): **EUP 50** Safety Listing: c(UL)us Listed Suitability Suitability - Indoor: Yes Transmission Characteristics (Connectivity) Notes (Overall) Notes: For proper installation refer to Installation Guide PX103826. Visit our web site at http://www.belden.com

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### **METRIC MEASUREMENT VERSION**



# AX102249 Faceplates and Panels - KeyConnect Faceplates 4-Port w/ID Windows Single-Gang

Item Number	Stainless Steel	Dark Gray	Almond	Black	lvory	Elec. White	Light Gray
1-Port w/ ID Windows Single-gang	AX104230	-	AX103922	AX104160	AX104565	AX102660	AX107021
2-Port w/ ID Windows Single-gang	AX104231	AX104455	AX103923	AX104161	AX104197	AX102655	AX107022
3-Port w/ ID Windows Single-gang	-	-	AX103924	AX104162	-	AX102661	-
4-Port w/ ID Windows Single-gang	AX104232	AX104464	AX102248	AX104163	AX104198	AX102249	AX107023
6-Port w/ ID Windows Single-gang	AX104233	-	AX102250	AX104164	AX104199	AX102251	AX107024
4-Port w/ ID Windows Double-gang	AX104479	-	-	-	-	-	-
6-Port w/ ID Windows Double-gang	AX104480	AX106594	AX102670	AX104165	AX104566	AX102671	AX107025
12-Port w/ ID Windows Double-gang	AX104234	-	AX102256	AX104166	AX104200	AX102257	-
1-Port Single-gang	AX102006	-	-	-	-	-	-
2-Port Single-gang	AX102007	-	-	-	-	-	-
4-Port Single-gang	AX102009	-	-	-	-	-	-
6-Port Single-gang	AX102010	-	-	-	-	-	-
12-Port Double-gang	AX102013	-	-	-	-	-	-
Wall Mount Phone Plate	AX104126	-	-	-	-	AX102902	-
Single-gang Back Box 1.89 in.	-	-	AX104127	-	-	AX102657	-
Double-gang Back Box 1.89 in.	-	-	AX104130	AX106684	-	AX104131	AX106685

### **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
AX102249	1 EA	0.111 LB			KCONN FACEPLATE 4-P SG WHITE

Revision Number: 0 Revision Date: 03-20-2017

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### METRIC MEASUREMENT VERSION



# AX101437 Faceplates and Panels - Interface Plates 4 Port Single Gang Flush







For more Information please call

1-800-Belden1



### **General Description:** Interface Plates 4 Port Single Gang Flush Usage (Overall) Suitable Applications: Compatible with a variety of modules that are suitable for use with Belden IBDN Systems 10GX, 4800,3600, 2400 and 1200. Related Parts: - Compatible with 10GX, CAT6+ and CAT5E MDVO-style Modular Jacks and MDVO Multimedia Modules Physical Characteristics (Connectivity) Capacity Max. Capacity: 4 ports Access Front Connection: Flush **Dimensions** Dimensions: Height (mm) Width (mm) Depth (mm) 114.046 76.200 11.684 **Materials** Materials: **Description Material** Plate Plastic - UL94V-0 Color White Color: Weight Weight: 0.050 kg **Included Parts** Included Parts: blank, 6-32 screw, carton label, clear window, installation sheet Packaging Packaging: Individually packaged in a plastic bag. **Mechanical Characteristics (Connectivity)** Connector/Hardware Retention: 88 964 N Storage Temperature Range: -40°C To +70°C Installation Temperature Range: -10°C To +60°C -10°C To +60°C Operating Temperature Range: Applicable Specifications and Agency Compliance (Overall) **Applicable Standards & Environmental Programs** EU Directive 2002/95/EC (RoHS): Yes EU RoHS Compliance Date (mm/dd/yyyy): 07/01/2006 MII Order #39 (China RoHS): Safety Listing: ACA, Bi-national Standard Listed Suitability Suitability - Indoor: **Transmission Characteristics (Connectivity)** Notes (Overall)

Notes: For proper installation refer to Installation Guide PX101806 included with the product or visit our web site at http://www.belden.com

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### **METRIC MEASUREMENT VERSION**



# AX101437 Faceplates and Panels - Interface Plates 4 Port Single Gang Flush

### **Product Family**

### Part Numbers:

Description	Gray	Almond	White	Black	Ivory
Interface Plate Flush 2-port Single Gang	AX101431	AX101432	AX101433	AX101434	AX102582
Interface Plate Flush 4-port Single Gang	AX101435	AX101436	AX101437	AX101438	AX102583
Interface Plate Flush 6-port Single Gang	AX101439	AX101440	AX101441	AX101442	AX102584
Interface Surface Adapter Box Single gang	AX101474	AX101475	AX101476	AX101477	AX102589

### **Put Ups and Colors:**

It	em #	Putup	Ship Weight	Color	Notes	Item Desc
Α	X101437	1 EA	0.038 KG	WHITE		INTERFACE PLATE 4-PORT, WHI

Revision Number: 0 Revision Date: 06-02-2009

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### METRIC MEASUREMENT VERSION



# AX104126 Faceplates and Panels - Wall Mount Phone Plates PlatesRecessed 1-Port







For more Information please call

1-800-Belden1



General Description:	
Wall Mount Phone Plates, Recessed 1	-Port, Stainless Steel
Jsage (Overall)	
Suitable Applications:	- Compatible with a variety of modules that are suitable for use with Belden IBDN Systems 10GX, 4800, 3600, 2400, fiber and coax
Related Parts:	<ul> <li>Compatible with KeyConnect-style Modular Jacks 10GX, CAT6+, CAT5E and KeyConnect-style Fiber and Coax Connectors</li> </ul>
Physical Characteristics (Connectivity)	
Capacity	
Max. Capacity:	1-port
Access	
Front Connection:	Flush, Recessed
Dimensions Dimensions:	
Height (mm)         Width (mm)         Depth (mm)           114.300         69.850         6.604	
Materials Materials:  Description Material Plate   Stainless Steel	
Weight	
Weight:	0.050 kg
Included Parts	0.000 Ng
Included Parts:	6-32 screw
	0-02 Sciew
Packaging Packaging:	Individually packaged in a plastic bag.
r ackayıng.	пилициану раскадец пта ризвис рад.
Mechanical Characteristics (Connectivity)	
Connector/Hardware Retention:	88.964 N
Storage Temperature Range:	-40°C To +70°C
Installation Temperature Range:	-10°C To +60°C
Operating Temperature Range:	-10°C To +60°C
Applicable Specifications and Agency Compl	iance (Overall)
Applicable Standards & Environmental Programs	
EU Directive 2002/95/EC (RoHS):	Yes
EU RoHS Compliance Date (mm/dd/yyyy):	07/01/2006
MII Order #39 (China RoHS):	Yes
Safety Listing:	Bi-national Standard Listed
Suitability	
Suitability - Indoor:	Yes
Transmission Characteristics (Connectivity)	
Notes (Overall)	
Notes: For proper installation refer to Installation Guide P	X103826. Visit our web site at http://www.belden.com
Product Family	
Part Numbers:	

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### **METRIC MEASUREMENT VERSION**



### AX104126 Faceplates and Panels - Wall Mount Phone Plates PlatesRecessed 1-Port

1-Port w/ ID Windows Single-gang	AX104230	-	AX103922	AX104160	AX104565	AX102660	AX107021
2-Port w/ ID Windows Single-gang	AX104231	AX104455	AX103923	AX104161	AX104197	AX102655	AX107022
3-Port w/ ID Windows Single-gang	-	-	AX103924	AX104162	-	AX102661	-
4-Port w/ ID Windows Single-gang	AX104232	AX104464	AX102248	AX104163	AX104198	AX102249	AX107023
6-Port w/ ID Windows Single-gang	AX104233	-	AX102250	AX104164	AX104199	AX102251	AX107024
4-Port w/ ID Windows Double-gang	AX104479	-	-	-	-	-	-
6-Port w/ ID Windows Double-gang	AX104480	AX106594	AX102670	AX104165	AX104566	AX102671	AX107025
12-Port w/ ID Windows Double-gang	AX104234	-	AX102256	AX104166	AX104200	AX102257	-
1-Port Single-gang	AX102006	-	-	-	-	-	-
2-Port Single-gang	AX102007	-	-	-	-	-	-
4-Port Single-gang	AX102009	-	-	-	-	-	-
6-Port Single-gang	AX102010	-	-	-	-	-	-
12-Port Double-gang	AX102013	-	-	-	-	-	-
Wall Mount Phone Plate	AX104126	-	-	-	-	AX102902	-
Single-gang Back Box 1.89 in.	-	-	AX104127	-	<b>i</b> -	AX102657	-
Double-gang Back Box 1.89 in.	-	-	AX104130	AX106684	1-	AX104131	AX106685
	1						

### **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
AX104126	1 EA	0.040 KG			KCONN WALLPHONE PLATE SSTEEL

Revision Number: 0 Revision Date: 12-17-2014

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### **ENGLISH MEASUREMENT VERSION**



# AX103926 Faceplates and Panels - KeyConnect Modular Furniture Adapter, 4 Port







For more Information please call

1-800-Belden1



### **General Description:** KeyConnect Modular Furniture Adapter, 4 Port Usage (Overall) Suitable Applications: - Compatible with a variety of modules that are suitable for use with Belden IBDN Systems 10GX, 4800, 3600, 2400 and 1200 Related Parts: - Compatible with 10GX, CAT6+ and CAT5E KeyConnect UTP and Multimedia Modules **Physical Characteristics (Connectivity)** Capacity Max. Capacity: 4 inserts Access Front Connection: Flush **Dimensions** Dimensions: Height (in.) Width (in.) Depth (in.) 1.840 3.130 0.190 **Materials** Materials: Description Material Modular Furniture Adapter | Plastic - UL94V-0 Color Color: Almond Weight 0.040 lbs Weight: **Included Parts Included Parts:** installation sheet, blank Packaging Packaging: Individually packaged in a plastic bag. **Mechanical Characteristics (Connectivity)** Footprint/Type: KevConnect Storage Temperature Range: -40°C To +70°C Installation Temperature Range: -10°C To +60°C -10°C To +60°C **Operating Temperature Range:** Applicable Specifications and Agency Compliance (Overall) **Applicable Standards & Environmental Programs** EU Directive 2002/95/EC (RoHS): Yes EU RoHS Compliance Date (mm/dd/yyyy): 07/01/2006 MII Order #39 (China RoHS): Safety Listing: Bi-national Standard Listed Suitability Suitability - Indoor: Yes **Transmission Characteristics (Connectivity)** Notes (Overall) Notes: For proper installation refer to installation guide included with the product or visit our web site at http://www.belden.com

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#### **ENGLISH MEASUREMENT VERSION**



# AX103926 Faceplates and Panels - KeyConnect Modular Furniture Adapter, 4 Port

Notes (Cont'd.):

• Wall opening: Minimum 2.67 X 1.35 in., Maximum 2.75 X 1.38 in.

. Wall thickness: Maximum 0.075 in.

#### **Product Family**

#### Part Numbers:

Description	Almond	Elec. White	Black	Dark Gray	Light Gray
KeyConnect Modular Furniture Adapter 3 Ports	AX103925	AX102291	AX102292	AX104457	AX107029
KeyConnect Modular Furniture Adapter 4 Ports	AX103926	AX102900	AX102901	AX104459	AX107034

#### **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
AX103926	1 EA	0.020 KG			KCONN MOD FURN ADAP 4-P ALM

Revision Number: 0 Revision Date: 12-12-2016

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#### **ENGLISH MEASUREMENT VERSION**



# AX105353 Faceplates and Panels - KeyConnect Side Entry Box without Shutter Door 2-Port







For more Information please call

1-800-Belden1



#### **General Description:** KeyConnect Side Entry Box without Shutter Door 2-Port Usage (Overall) Suitable Applications: - Compatible with a variety of modules that are suitable for use with Belden IBDN Systems 10GX, 4800,3600, 2400 and 1200. Related Parts: - Compatible with 10GX, CAT6+ and CAT5E KeyConnect UTP Modules, as well as KeyConnect Multimedia Modules **Physical Characteristics (Connectivity)** Capacity Max. Capacity: 2 ports Access Front Connection: Flush **Dimensions** Dimensions: Height (in.) Width (in.) Depth (in.) 2.680 2.560 1.200 **Materials** Materials: Side Entry Box | Plastic - UL94V-0 Weight Weight: 0.120 lbs. Packaging Packaging: Individually packaged in a plastic bag. **Mechanical Characteristics (Connectivity)** Footprint/Type: KeyConnect -40°C To +70°C Storage Temperature Range: -10°C To +60°C Installation Temperature Range: **Operating Temperature Range:** -10°C To +60°C Applicable Specifications and Agency Compliance (Overall) **Applicable Standards & Environmental Programs** EU Directive 2002/95/EC (RoHS): Yes EU RoHS Compliance Date (mm/dd/yyyy): 07/01/2006 MII Order #39 (China RoHS): Yes Safety Listing: Bi-national Standard Listed Suitability Suitability - Indoor: Yes Transmission Characteristics (Connectivity)

## Notes (Overall)

Notes: For more information visit our web site at http://www.belden.com

Notes (Cont'd.): NOT Recommanded for installation with Cable over 0.25" (6.35mm) O.D.

## **Product Family**

Part Numbers:

Description	Almond	Elec. White
KeyConnect Side-Entry Boxes without Shutter Door 1-Port	AX105352-AL	AX105352-EW

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# AX105353 Faceplates and Panels - KeyConnect Side Entry Box without Shutter Door 2-Port

KeyConnect Side-Entry Boxes without Shutter Door 2-Ports | AX105353-AL | AX105353-EW KeyConnect Side-Entry Boxes without Shutter Door 4-Ports AX105354-AL AX105354-EW KeyConnect Side-Entry Boxes without Shutter Door 6-Ports AX105355-AL AX105355-EW

#### **Put Ups and Colors:**

Item# Putup Ship Weight Color	Notes	Item Desc
-------------------------------	-------	-----------

Revision Number: 0 Revision Date: 11-05-2013

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## RVAMJKUxx-S1 Modular Connectors - 10GX Modular Jack -REVConnect

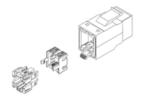
#### **Preview Document. Not Live Data.**

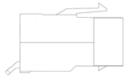


For more Information please call

1-800-Belden1







## **Description**

10GX Modular Jack, Category 6A, RJ45, REVConnect

# Usage (Overall):

Suitable Applications	IBDN System 10GX, TIA Category 6A, ISO Class EA, 10GBASE-T
Related Parts	Compatible with KeyConnect Faceplates, Adapters, Boxes and Patch Panels

## **Physical Characteristics (Connectivity):**

#### **Dimensions:**

**Dimensions** 

Height (in.)	Width (in.)	Depth (in.)
0.940	0.640	1.337

#### Materials:

Materials

Description	Туре	Material
Front Connection	RJ45	Flexible PCB with 50u inch Gold over Nickel
Rear Connection	Lead Frame	Copper Alloy with 50u inch Gold over Nickel
Connector Body	N/A	Plastic - UL94V-0

### Color:

Color

Almond, Black, Blue, Blue (TIA 606), Brown, Brown (TIA 606), Elec. White, Gray, Green Green (TIA 606), Ivory, Orange, Orange (TIA 606), Purple, Purple (TIA 606), Red, Red (TIA 606), Yellow, Yellow (TIA 606)

Wiring Scheme:

Wiring Scheme T568A/B
Weight:

Weight:

 Packaging:
 Individually packaged in a plastic bag.

Mechanical Characteristics (Connectivity):

Footprint/Type KeyConnect
Plug / Jack Compatibility RJ45, RJ11

0.016 lbs.

#### Termination Interface

Termination	Connection	Durabilities
Front	Mated Connection	750 cycles
Rear	Mated Connection	20 cycles

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# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



# RVAMJKUxx-S1 Modular Connectors - 10GX Modular Jack -REVConnect

Cable/Connector Retention:	15 lbs.
Connector/Hardware Retention:	20 lbs.
Plug/Connector Retention:	11.250 lbs.
Storage Temperature Range	-40°C To +70°C
Installation Temperature Range	-10°C To +60°C
Operating Temperature Range	-10°C To +60°C
Tool Compatibility	REVConnect Termination Tool

# Applicable Specifications and Agency Compliance (Overall):

**Applicable Standards & Environmental Programs:** 

Other Standards	FCC Part 68, Subpart F, IEC 60603-7
EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	07/01/2006
MII Order #39 (China RoHS)	EUP 50
Telecommunications Standards	ISO/IEC 11801:2002 Amendment 2
Third Party Performance Verification	ETL - Verified Category 6A
Safety Listing	Bi-national Standard Listed
Suitability: Suitability - Indoor	Yes - Indoor

# **Transmission Characteristics (Connectivity):**

#### Mated Connection Table 1

Frequency (MHz)		Max. Insertion Loss Belden** (dB)		Min. NEXT Belden** (dB)	Min. FEXT TIA* (dB)	Min. FEXT Belden** (dB)
1.000	0.100	0.050	75.000	77.000	75.000	80.000
4.000	0.100	0.050	75.000	77.000	71.100	75.100
8.000	0.100	0.050	75.000	77.000	65.000	69.000
10.000	0.100	0.050	74.000	77.000	63.100	67.100
16.000	0.100	0.060	69.900	72.900	59.000	63.000
20.000	0.100	0.070	68.000	71.000	57.100	61.100
25.000	0.100	0.080	66.000	69.000	55.100	59.100
31.250	0.110	0.090	64.100	67.100	53.200	57.200
62.500	0.160	0.140	58.100	61.100	47.200	51.200
100.000	0.200	0.180	54.000	57.000	43.100	47.100
200.000	0.280	0.260	48.000	51.000	37.100	41.100
250.000	0.320	0.300	46.000	49.000	35.100	39.100
300.000	0.350	0.330	42.900	46.700	33.600	37.600
400.000	0.400	0.380	37.900	42.900	31.100	35.100
500.000	0.450	0.430	34.000	40.000	29.100	33.100
625.000		0.480		37.100		31.200

Mated Connection Table - Footnote

- \* TIA/EIA-568-B.2-10-2008 Category 6A Standard.
  \*\* Worst-case performance for a 10GX mated connection using 10GX modular plugs.

## Mated Connection Table 2

	Return Loss	Min. Return Loss Belden** (dB)	Min. PSANEXT TIA* (dB)	Min. PSANEXT Belden** (dB)	Min. PSAACRF TIA* (dB)	Min. PSAACRF Belden** (dB)	Min. Balanced TCL TIA* (dB)	Min. Balanced TCL Belden** (dB)
1.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
4.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
8.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
10.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
16.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
20.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000

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**ENGLISH MEASUREMENT VERSION** 



#### RVAMJKUxx-S1 Modular Connectors - 10GX Modular Jack -REVConnect

25.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
31.250	30.000	34.100	70.500	72.000	67.000	72.000	38.100	45.000
62.500	30.000	34.100	70.500	72.000	67.000	72.000	32.100	39.100
100.000	28.000	30.000	70.500	72.000	67.000	72.000	28.000	35.000
200.000	22.000	24.000	64.500	66.000	61.000	66.000	22.000	29.000
250.000	20.000	22.000	62.500	64.000	59.000	64.000	20.000	27.000
300.000	18.500	20.500	61.000	62.500	57.500	62.500	18.500	25.500
400.000	16.000	18.000	58.500	60.000	55.000	60.000	16.000	23.000
500.000	14.000	16.000	56.500	58.000	53.000	58.000	14.000	21.000
625.000		13.000		56.100		56.100		19.100

1,000 V RMS @ 60 Hz for 1 minute Dielectric Strength

Current Rating:	1.500 A
Insulation Resistance	500 M-Ohm Minimum
Max. Contact Resistance	20 m-Ohm
Termination Resistance	2.5 m-Ohm

#### Notes (Overall):

Please see Installation Guide PX106434. Notes

#### **Product Family:**

Part Number List

Item Number	Color
RVAMJKUGY-S1	Gray
RVAMJKUAL-S1	Almond
RVAMJKUEW-S1	Elec. White
RVAMJKUBK-S1	Black
RVAMJKUIV-S1	Ivory
RVAMJKUBR-S1	Brown
RVAMJKURD-S1	Red
RVAMJKUOR-S1	Orange
RVAMJKUYL-S1	Yellow
RVAMJKUGN-S1	Green
RVAMJKUBL-S1	Blue
RVAMJKUPR-S1	Purple
RVAMJKUTN-S1	Brown (TIA)
RVAMJKUTR-S1	Red (TIA)
RVAMJKUTO-S1	Orange (TIA)
RVAMJKUTY-S1	Yellow (TIA)
RVAMJKUTG-S1	Green (TIA)
RVAMJKUTB-S1	Blue (TIA)
RVAMJKUTP-S1	Purple (TIA)

Revision Number: 0 Revision Date: 05-18-2016

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#### **METRIC MEASUREMENT VERSION**



# AX102283 Modular Connectors - 10GX Modular Jack -KeyConnect







For more Information please call

1-800-Belden1



#### **General Description:**

10GX Modular Jack, Category 6A, RJ45, KeyConnect, Black

#### Usage (Overall)

Suitable Applications:	IBDN System 10GX, TIA Category 6A, ISO Class EA, 10GBASE-T
Related Parts:	Compatible with KeyConnect Faceplates, Adapters, Boxes and Patch Panels

#### **Physical Characteristics (Connectivity)**

#### **Dimensions**

Dimensions:

Height (mm)	Width (mm)	Depth (mm)
22.860	17.145	29.718

#### Materials

#### Materials:

Description	Туре	Material
Front Connection	Flexible PCB	Flexible PCB with 50u inch Gold over Nickel
Rear Connection	IDC	Phosphor Bronze with Tin Plating over Nickel
Connector Body	N/A	Plastic - UL940V-0

#### Color

Front Connection	Flexible PCB	Flexible PCB with 50u inch Gold over Nickel
Rear Connection	IDC	Phosphor Bronze with Tin Plating over Nickel
Connector Body	N/A	Plastic - UL940V-0

# Color: Wiring Scheme

Wiring Scheme: T568A/B

## Weight

Weight: 0.007 kg

#### **Included Parts**

Included Parts: 1 X-Bar

#### **Packaging**

Packaging: Individually packaged in a plastic bag. Standard pack of 50 units.

Black

## **Mechanical Characteristics (Connectivity)**

Mated Connection | 750 cycles

Footprint/Type: KeyConnect Plug / Jack Compatibility: RJ45, RJ11

#### Termination Interface: **Termination Connection**

Rear	IDC Connection 20 termination		
Cable/C	onnector Retention:	66.723 N	
Connec	tor/Hardware Retention:	88.964 N	
Plug/Co	nnector Retention:	50.042 N	
Storage	Temperature Range:	-40°C To +70°C	
Installat	tion Temperature Range:	-10°C To +60°C	

-10°C To +60°C

Belden 110 Connecting Tool

# Applicable Specifications and Agency Compliance (Overall)

# Applicable Standards & Environmental Programs

Operating Temperature Range:

**Tool Compatibility:** 

Other Standards:	FCC Part 68, Subpart F, IEC 60603-7
EU Directive 2002/95/EC (RoHS):	Yes
EU RoHS Compliance Date (mm/dd/yyyy):	07/01/2006

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#### **METRIC MEASUREMENT VERSION**



# AX102283 Modular Connectors - 10GX Modular Jack -KeyConnect

	MII Order #39 (China RoHS):	EUP 50				
	Telecommunications Standards:	Category 6A - TIA 568.B.2-10, ISO/IEC 11801:2002 Amendment 2				
	Third Party Performance Verification:	ETL - Verified Category 6A				
	Safety Listing:	ACA, Bi-national Standard Listed				
Sui	tability					
	Suitability - Indoor:	Yes - Indoor				

## **Transmission Characteristics (Connectivity)**

#### Mated Connection Table 1:

Frequency (MHz)	Max. Insertion Loss TIA* (dB)	Max. Insertion Loss Belden** (dB)	Min. NEXT TIA* (dB)	Min. NEXT Belden** (dB)	Min. FEXT TIA* (dB)	Min. FEXT Belden** (dB)
1.000	0.100	0.050	75.000	77.000	75.000	80.000
4.000	0.100	0.050	75.000	77.000	71.100	75.100
8.000	0.100	0.050	75.000	77.000	65.000	69.000
10.000	0.100	0.050	74.000	77.000	63.100	67.100
16.000	0.100	0.060	69.900	72.900	59.000	63.000
20.000	0.100	0.070	68.000	71.000	57.100	61.100
25.000	0.100	0.080	66.000	69.000	55.100	59.100
31.250	0.110	0.090	64.100	67.100	53.200	57.200
62.500	0.160	0.140	58.100	61.100	47.200	51.200
100.000	0.200	0.180	54.000	57.000	43.100	47.100
200.000	0.280	0.260	48.000	51.000	37.100	41.100
250.000	0.320	0.300	46.000	49.000	35.100	39.100
300.000	0.350	0.330	42.900	46.700	33.600	37.600
400.000	0.400	0.380	37.900	42.900	31.100	35.100
500.000	0.450	0.430	34.000	40.000	29.100	33.100
625.000		0.480		37.100		31.200

Mated Connection Table - Footnote:

#### Mated Connection Table 2:

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden** (dB)	Min. PSANEXT TIA* (dB)	Min. PSANEXT Belden** (dB)	Min. PSAACRF TIA* (dB)	Min. PSAACRF Belden** (dB)	Min. Balanced TCL TIA* (dB)	Min. Balanced TCL Belden** (dB)
1.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
4.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
8.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
10.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
16.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
20.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
25.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
31.250	30.000	34.100	70.500	72.000	67.000	72.000	38.100	45.000
62.500	30.000	34.100	70.500	72.000	67.000	72.000	32.100	39.100
100.000	28.000	30.000	70.500	72.000	67.000	72.000	28.000	35.000
200.000	22.000	24.000	64.500	66.000	61.000	66.000	22.000	29.000
250.000	20.000	22.000	62.500	64.000	59.000	64.000	20.000	27.000
300.000	18.500	20.500	61.000	62.500	57.500	62.500	18.500	25.500
400.000	16.000	18.000	58.500	60.000	55.000	60.000	16.000	23.000
500.000	14.000	16.000	56.500	58.000	53.000	58.000	14.000	21.000
625.000		13.000		56.100		56.100		19.100

Dielectric Strength: 1,000 V RMS @ 60 Hz for 1 minute

Current Rating:	1.500 A
Insulation Resistance:	50 M-Ohm Minimum
Max. Contact Resistance:	20 m-Ohm
Termination Resistance:	2.5 m-Ohm

#### Notes (Overall)

Notes: Please see Installation Guide PX103771.

#### **Product Family**

#### Part Number List:

Item Number	Color
AX102280	Gray
AX102281	Almond

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<sup>\*</sup> TIA/EIA-568-B.2-10-2008 Category 6A Standard.
\*\* Worst-case performance for a 10GX mated connection using 10GX modular plugs.

#### **METRIC MEASUREMENT VERSION**



# AX102283 Modular Connectors - 10GX Modular Jack -KeyConnect

AX102282	Elec. White
AX102283	Black
AX102284	Orange (TIA 606)
AX102285	Red (TIA 606)
AX102286	Yellow (TIA 606)
AX102287	Green (TIA 606)
AX102288	Blue (TIA 606)
AX102289	Purple (TIA 606)
AX103073	Ivory
AX104152	Orange
AX104153	Red
AX104154	Yellow
AX104155	Green
AX104156	Blue
AX104157	Purple

#### **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
AX102283	1 EA	0.024 LB			10GX JACK KCONN BLACK

Revision Date: 08-19-2011 Revision Number: 1

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Part Number: REVConnect CAT6+ Jacks

REVConnect CAT6+ UTP Modular Jack, T568 A/B

## **Product Description**

REVConnect CAT6+ Jacks are available in several colors and packaging quantities.

# **Technical Specifications**

#### **Product Overview**

Environmental Space:	Indoor
Suitable Applications:	2400, 3600, 4800 Systems, TIA Category 6, ISO Class E, 1GBASE-T

# **Physical Characteristics (Overall)**

Height:	0.94 m
Width:	0.64
Depth:	1.337
Termination Front Connection:	Mated Connection
Termination Rear Connection:	Mated Connection
Wiring Scheme:	T568A/B
Packaging:	Individually packaged in a plastic bag.
Weight:	0.016 lbs

#### Connectors

#### Materials

Description	Material	Туре
Front Connection	Copper Clad Flexible PCB, 50uin Gold plated contacts over Nickel	RJ45
Rear Connection	Copper alloy, Gold plated contacts over Nickel	REVConnect
Connector Body	PBT glass reinforced UL94V-0	

# **Electrical Characteristics**

Dielectric Strength:	1,000V RMS @ 60 Hz for 1 minute (Signals to Ground)
Current Rating:	1.300 A
Insulation Resistance:	500 M-Ohm Minimum
Max Contact Resistance:	20 mOhm
Termination Resistance:	2.5 mOhm

## **Temperature Range**

Installation Temp Range:	-10°C To +60°C
Storage Temp Range:	40°C To +70°C
Operating Temp Range:	-10°C To +60°C

## **Mechanical Characteristics**

Footprint/Type:	KeyConnect
Tool Compatibility:	REVConnect Termination Tool (p/n RVUTT01)
Plug /Jack Compatibility:	RJ45, RJ11
Termination Front Connection Durability:	750 cycles
Termination Rear Connection Durability:	20 cycles
Cable/Connector Retention:	15 lbs.

Connector/Hardware Retention:	20 lbs
Plug/Connector Retention:	11.250 lbs

# **Standards**

UL Rating:	UL94V-0
Data Category:	Category 6+
Telecommunications Standards:	Category 6 - TIA 568.C.2, Category 6 - ISO/IEC 11801:2002 Ed.2
IEEE Specification:	Power Over Ethernet (PoE) IEEE 802.3at type 1 and 2 (up to 30W), IEEE802.3bt/D1.7 type 3 and 4 (up to 100W), CISCO UPOE (up to 60W), Power over HDBaseTTM (up to 100W)
Other Specification:	UL 1863, IEC 60603-7, FCC part 68-F

# **Applicable Environmental and Other Programs**

EU Directive 2002/95/EC (RoHS):	Yes
EU RoHS Compliance Date (yyyy-mm-dd):	2006-07-01
MII Order #39 (China RoHS):	EUP 50

# Flammability, LS0H, Toxicity Testing

UL Flammability:	UL2043 Air Handling Spaces
Safety Listing:	c(UL)us Listed

# **Part Number**

Related Parts: Compatible with KeyConnect Faceplates, Adapters, Boxes and Patch Panels

# Variants

RV6MJKUAL-S1         Almond         Single Pack         T568A/B           RV6MJKUBK-B24         Almond         Bulk Pack (24)         T568A/B           RV6MJKUBK-S1         Black         Single Pack         T568A/B           RV6MJKUBK-B24         Black         Bulk Pack (24)         T568A/B           RV6MJKUBL-B24         Blue         Bulk Pack (24)         T568A/B           RV6MJKUBR-B24         Brown         Single Pack         T568A/B           RV6MJKUBR-B24         Brown         Bulk Pack (24)         T568A/B           RV6MJKUGY-S1         Gray         Single Pack         T568A/B           RV6MJKUGY-B24         Gray         Bulk Pack (24)         T568A/B           RV6MJKUGY-B24         Green         Single Pack         T568A/B           RV6MJKUGN-B24         Green         Bulk Pack (24)         T568A/B           RV6MJKUGN-B24         Ivory         Bulk Pack (24)         T568A/B           RV6MJKURD-B24         Ivory         Bulk Pack (24)         T568A/B           RV6MJKURD-S1         Orange         Bulk Pack (24)         T568A/B           RV6MJKUPR-S1         Purple         Bulk Pack (24)         T568A/B           RV6MJKURD-S24         Red         Bulk Pack (24)         T568A/B<	Item #	Color	Packaging	Wiring Scheme
RV6MJKUBK-B24 Black Single Pack T568A/B RV6MJKUBK-B24 Black Bulk Pack (24) T568A/B RV6MJKUBL-S1 Blue Single Pack T568A/B RV6MJKUBL-B24 Blue Bulk Pack (24) T568A/B RV6MJKUBR-S1 Brown Single Pack T568A/B RV6MJKUBR-B24 Brown Bulk Pack (24) T568A/B RV6MJKUBR-B24 Brown Bulk Pack (24) T568A/B RV6MJKUGY-S1 Gray Single Pack T568A/B RV6MJKUGY-B24 Gray Bulk Pack (24) T568A/B RV6MJKUGY-B24 Green Bulk Pack (24) T568A/B RV6MJKUGN-B24 Green Bulk Pack (24) T568A/B RV6MJKUIV-S1 Ivory Single Pack T568A/B RV6MJKUIV-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUOR-B24 Orange Bulk Pack (24) T568A/B RV6MJKUOR-B24 Purple Bulk Pack (24) T568A/B RV6MJKUPR-S1 Purple Single Pack T568A/B RV6MJKURD-B24 Red Single Pack T568A/B RV6MJKURD-B24 Red Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Blue Single Pack T568A/B RV6MJKUTB-B24 TIA Blue Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Brown Single Pack T568A/B RV6MJKUTN-S1 TIA Green Bulk Pack (24) T568A/B RV6MJKUTD-S2 TIA Green Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTD-S1 TIA Green Bulk Pack (24) T568A/B RV6MJKUTD-S2 TIA Green Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Purple Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Purple Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Red Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Purple Bulk Pack (2	RV6MJKUAL-S1	Almond	Single Pack	T568A/B
RV6MJKUBK-B24 Black Bulk Pack (24) T568A/B RV6MJKUBL-S1 Blue Single Pack T568A/B RV6MJKUBL-B24 Blue Bulk Pack (24) T568A/B RV6MJKUBR-B24 Brown Bulk Pack (24) T568A/B RV6MJKUBR-B24 Brown Bulk Pack (24) T568A/B RV6MJKUGY-S1 Gray Single Pack T568A/B RV6MJKUGY-B24 Gray Bulk Pack (24) T568A/B RV6MJKUGN-B24 Green Bulk Pack (24) T568A/B RV6MJKUGN-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUIV-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUOR-B24 Orange Bulk Pack (24) T568A/B RV6MJKUOR-B24 Orange Bulk Pack (24) T568A/B RV6MJKUOR-B24 Purple Single Pack T568A/B RV6MJKURD-S1 Red Single Pack T568A/B RV6MJKURD-S1 Red Single Pack T568A/B RV6MJKURD-S1 Red Single Pack T568A/B RV6MJKURD-B24 Red Bulk Pack (24) T568A/B RV6MJKURD-B24 Red Bulk Pack (24) T568A/B RV6MJKURD-B24 TIA Blue Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Blue Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Brown Single Pack T568A/B RV6MJKUTN-S1 TIA Brown Bulk Pack (24) T568A/B RV6MJKUTD-S2 TIA Green Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Purple Single Pack T568A/B RV6MJKUTO-B24 TIA Purple Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Purple Single Pa	RV6MJKUAL-B24	Almond	Bulk Pack (24)	T568A/B
RV6MJKUBL-S1 Blue Single Pack T568A/B RV6MJKUBL-B24 Blue Bulk Pack (24) T568A/B RV6MJKUBR-S1 Brown Single Pack T568A/B RV6MJKUBR-B24 Brown Bulk Pack (24) T568A/B RV6MJKUGY-S1 Gray Single Pack T568A/B RV6MJKUGY-B24 Gray Bulk Pack (24) T568A/B RV6MJKUGN-B24 Green Bulk Pack (24) T568A/B RV6MJKUGN-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUIV-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUOR-B24 Orange Bulk Pack (24) T568A/B RV6MJKUOR-B24 Orange Bulk Pack (24) T568A/B RV6MJKUPR-B24 Purple Bulk Pack (24) T568A/B RV6MJKUPR-B24 Red Bulk Pack (24) T568A/B RV6MJKURD-S1 Red Single Pack T568A/B RV6MJKURD-S1 Red Single Pack T568A/B RV6MJKURD-B24 Red Bulk Pack (24) T568A/B RV6MJKURD-B24 Red Bulk Pack (24) T568A/B RV6MJKURD-B24 TIA Blue Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Blue Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Brown Single Pack T568A/B RV6MJKUTN-S1 TIA Brown Bulk Pack (24) T568A/B RV6MJKUTN-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTG-S1 TIA Green Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Purple Single Pack T568A/B RV6MJKUTD-B24 TIA Purple Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Red Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Red Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Purple Single Pack T568A/B	RV6MJKUBK-S1	Black	Single Pack	T568A/B
RV6MJKUBL-B24         Blue         Bulk Pack (24)         T568A/B           RV6MJKUBR-S1         Brown         Single Pack         T568A/B           RV6MJKUBR-B24         Brown         Bulk Pack (24)         T568A/B           RV6MJKUGY-S1         Gray         Single Pack         T568A/B           RV6MJKUGY-B24         Gray         Bulk Pack (24)         T568A/B           RV6MJKUGN-S1         Green         Single Pack         T568A/B           RV6MJKUIV-S1         Ivory         Single Pack         T568A/B           RV6MJKUIV-B24         Ivory         Bulk Pack (24)         T568A/B           RV6MJKUIV-B24         Ivory         Bulk Pack (24)         T568A/B           RV6MJKUOR-S1         Orange         Single Pack         T568A/B           RV6MJKUOR-B24         Orange         Bulk Pack (24)         T568A/B           RV6MJKUPR-B24         Purple         Single Pack         T568A/B           RV6MJKUPR-B24         Purple         Bulk Pack (24)         T568A/B           RV6MJKURD-B24         Red         Single Pack         T568A/B           RV6MJKUTB-B1         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Brown         Single Pack         T568A/B	RV6MJKUBK-B24	Black	Bulk Pack (24)	T568A/B
RV6MJKUBR-S1 Brown Single Pack T568A/B RV6MJKUGY-S1 Gray Single Pack T568A/B RV6MJKUGY-B24 Gray Bulk Pack (24) T568A/B RV6MJKUGY-B24 Gray Bulk Pack (24) T568A/B RV6MJKUGN-B24 Green Single Pack T568A/B RV6MJKUIV-S1 Ivory Single Pack T568A/B RV6MJKUIV-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUIV-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUIV-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUOR-S1 Orange Single Pack T568A/B RV6MJKUPR-B24 Purple Single Pack T568A/B RV6MJKUPR-B24 Purple Bulk Pack (24) T568A/B RV6MJKURD-S1 Red Single Pack T568A/B RV6MJKURD-B24 Red Bulk Pack (24) T568A/B RV6MJKURD-B24 Red Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Blue Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Brown Single Pack T568A/B RV6MJKUTD-S1 TIA Green Single Pack T568A/B RV6MJKUTO-S1 TIA Green Bulk Pack (24) T568A/B RV6MJKUTO-S1 TIA Orange Single Pack T568A/B RV6MJKUTO-S1 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTO-S1 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTO-S1 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Purple Bulk Pack (24) T568A/B RV6MJKUTD-S1 TIA Purple Single Pack T568A/B RV6MJKUTD-S24 TIA Purple	RV6MJKUBL-S1	Blue	Single Pack	T568A/B
RV6MJKUBR-B24 Brown Bulk Pack (24) T568A/B RV6MJKUGY-S1 Gray Single Pack T568A/B RV6MJKUGY-B24 Gray Bulk Pack (24) T568A/B RV6MJKUGN-B24 Green Single Pack T568A/B RV6MJKUIV-S1 Ivory Single Pack T568A/B RV6MJKUIV-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUIV-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUOR-S1 Orange Single Pack T568A/B RV6MJKUOR-B24 Orange Bulk Pack (24) T568A/B RV6MJKUPR-S1 Purple Single Pack T568A/B RV6MJKURD-B24 Red Single Pack T568A/B RV6MJKURD-B24 Red Bulk Pack (24) T568A/B RV6MJKURD-B24 TIA Blue Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Brown Bulk Pack (24) T568A/B RV6MJKUTN-S1 TIA Green Single Pack T568A/B RV6MJKUTO-S1 TIA Orange Single Pack T568A/B RV6MJKUTO-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Orange Single Pack T568A/B RV6MJKUTO-B24 TIA Orange Single Pack T568A/B RV6MJKUTO-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Purple Single Pack T568A/B RV6MJKUTD-B24 TIA	RV6MJKUBL-B24	Blue	Bulk Pack (24)	T568A/B
RV6MJKUGY-S1         Gray         Single Pack         T568A/B           RV6MJKUGY-B24         Gray         Bulk Pack (24)         T568A/B           RV6MJKUGN-S1         Green         Single Pack         T568A/B           RV6MJKUGN-B24         Green         Bulk Pack (24)         T568A/B           RV6MJKUIV-S1         Ivory         Single Pack         T568A/B           RV6MJKUIV-B24         Ivory         Bulk Pack (24)         T568A/B           RV6MJKUOR-S1         Orange         Single Pack         T568A/B           RV6MJKUPR-S24         Orange         Bulk Pack (24)         T568A/B           RV6MJKUPR-B24         Purple         Bulk Pack (24)         T568A/B           RV6MJKURD-B24         Purple         Bulk Pack (24)         T568A/B           RV6MJKURD-B1         Red         Single Pack         T568A/B           RV6MJKUTB-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKUTB-B24         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-S1         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTN-S24         TIA Green         Bulk Pack (24)         T	RV6MJKUBR-S1	Brown	Single Pack	T568A/B
RV6MJKUGY-B24 Gray Bulk Pack (24) T568A/B RV6MJKUGN-S1 Green Single Pack T568A/B RV6MJKUGN-B24 Green Bulk Pack (24) T568A/B RV6MJKUIV-B24 Ivory Single Pack T568A/B RV6MJKUIV-B24 Ivory Bulk Pack (24) T568A/B RV6MJKUOR-B24 Orange Single Pack T568A/B RV6MJKUOR-B24 Orange Bulk Pack (24) T568A/B RV6MJKUPR-S1 Purple Single Pack T568A/B RV6MJKUPR-B24 Purple Bulk Pack (24) T568A/B RV6MJKURD-S1 Red Single Pack T568A/B RV6MJKURD-B24 Red Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Blue Single Pack T568A/B RV6MJKUTB-B24 TIA Blue Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Brown Single Pack T568A/B RV6MJKUTN-S1 TIA Brown Single Pack T568A/B RV6MJKUTN-S2 TIA Green Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Purple Single Pack T568A/B RV6MJKUTD-B24 TIA Purple Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Purple Single Pack T568A/B	RV6MJKUBR-B24	Brown	Bulk Pack (24)	T568A/B
RV6MJKUGN-S1         Green         Single Pack         T568A/B           RV6MJKUGN-B24         Green         Bulk Pack (24)         T568A/B           RV6MJKUIV-S1         Ivory         Single Pack         T568A/B           RV6MJKUIV-B24         Ivory         Bulk Pack (24)         T568A/B           RV6MJKUOR-S1         Orange         Single Pack         T568A/B           RV6MJKUOR-B24         Orange         Bulk Pack (24)         T568A/B           RV6MJKUPR-B24         Purple         Single Pack         T568A/B           RV6MJKURD-S1         Red         Single Pack         T568A/B           RV6MJKURD-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKURD-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKUTB-B24         TIA Blue         Single Pack         T568A/B           RV6MJKUTN-S1         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-B24         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTG-S1         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTG-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)	RV6MJKUGY-S1	Gray	Single Pack	T568A/B
RV6MJKUGN-B24         Green         Bulk Pack (24)         T568A/B           RV6MJKUIV-S1         Ivory         Single Pack         T568A/B           RV6MJKUIV-B24         Ivory         Bulk Pack (24)         T568A/B           RV6MJKUOR-S1         Orange         Single Pack         T568A/B           RV6MJKUOR-B24         Orange         Bulk Pack (24)         T568A/B           RV6MJKUPR-S1         Purple         Single Pack         T568A/B           RV6MJKURD-S1         Red         Single Pack         T568A/B           RV6MJKURD-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKUTB-B1         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Blue         Bulk Pack (24)         T568A/B           RV6MJKUTN-S1         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-B24         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTG-S1         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTG-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Bulk Pack (24	RV6MJKUGY-B24	Gray	Bulk Pack (24)	T568A/B
RV6MJKUIV-S1         Ivory         Single Pack         T568A/B           RV6MJKUIV-B24         Ivory         Bulk Pack (24)         T568A/B           RV6MJKUOR-S1         Orange         Single Pack         T568A/B           RV6MJKUOR-B24         Orange         Bulk Pack (24)         T568A/B           RV6MJKUPR-B1         Purple         Single Pack         T568A/B           RV6MJKUPR-B24         Purple         Bulk Pack (24)         T568A/B           RV6MJKURD-S1         Red         Single Pack         T568A/B           RV6MJKUTB-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKUTB-S1         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-S1         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-B24         TIA Green         Single Pack         T568A/B           RV6MJKUTG-S1         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTO-S1         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTD-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Bulk Pack (24) <td>RV6MJKUGN-S1</td> <td>Green</td> <td>Single Pack</td> <td>T568A/B</td>	RV6MJKUGN-S1	Green	Single Pack	T568A/B
RV6MJKUIV-B24         Ivory         Bulk Pack (24)         T568A/B           RV6MJKUOR-S1         Orange         Single Pack         T568A/B           RV6MJKUOR-B24         Orange         Bulk Pack (24)         T568A/B           RV6MJKUPR-B24         Purple         Single Pack         T568A/B           RV6MJKUPR-B24         Purple         Bulk Pack (24)         T568A/B           RV6MJKURD-S1         Red         Single Pack         T568A/B           RV6MJKURD-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKUTB-S1         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Brown         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-S1         TIA Green         Single Pack         T568A/B           RV6MJKUTO-S24         TIA Green         Single Pack         T568A/B           RV6MJKUTO-B24         TIA Orange         Single Pack         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-S24         TIA Purple         Bulk Pack (24)<	RV6MJKUGN-B24	Green	Bulk Pack (24)	T568A/B
RV6MJKUOR-S1         Orange         Single Pack         T568A/B           RV6MJKUOR-B24         Orange         Bulk Pack (24)         T568A/B           RV6MJKUPR-S1         Purple         Single Pack         T568A/B           RV6MJKUPR-B24         Purple         Bulk Pack (24)         T568A/B           RV6MJKURD-S1         Red         Single Pack         T568A/B           RV6MJKURD-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKUTB-S1         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Blue         Bulk Pack (24)         T568A/B           RV6MJKUTB-B24         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-S1         TIA Brown         Bulk Pack (24)         T568A/B           RV6MJKUTN-B24         TIA Green         Single Pack         T568A/B           RV6MJKUTG-B24         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTO-B24         TIA Orange         Single Pack         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-S1         TIA Red         Single Pack	RV6MJKUIV-S1	Ivory	Single Pack	T568A/B
RV6MJKUOR-B24         Orange         Bulk Pack (24)         T568A/B           RV6MJKUPR-S1         Purple         Single Pack         T568A/B           RV6MJKUPR-B24         Purple         Bulk Pack (24)         T568A/B           RV6MJKURD-S1         Red         Single Pack         T568A/B           RV6MJKURD-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKUTB-S1         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Blue         Bulk Pack (24)         T568A/B           RV6MJKUTB-B24         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-S1         TIA Brown         Bulk Pack (24)         T568A/B           RV6MJKUTG-S1         TIA Green         Single Pack         T568A/B           RV6MJKUTG-B24         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-S24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-S1         TIA Red         Single Pack         T568A/B           RV6MJKUTR-S24         TIA Red         Bulk Pa	RV6MJKUIV-B24	Ivory	Bulk Pack (24)	T568A/B
RV6MJKUPR-B24 Purple Single Pack T568A/B RV6MJKUPR-B24 Purple Bulk Pack (24) T568A/B RV6MJKURD-B24 Red Single Pack T568A/B RV6MJKURD-B24 Red Bulk Pack (24) T568A/B RV6MJKUTB-B24 TIA Blue Single Pack T568A/B RV6MJKUTB-B24 TIA Blue Bulk Pack (24) T568A/B RV6MJKUTN-S1 TIA Brown Single Pack T568A/B RV6MJKUTN-B24 TIA Brown Bulk Pack (24) T568A/B RV6MJKUTN-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTG-S1 TIA Green Bulk Pack (24) T568A/B RV6MJKUTG-B24 TIA Orange Single Pack T568A/B RV6MJKUTO-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTD-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTP-B24 TIA Purple Single Pack T568A/B RV6MJKUTP-B24 TIA Purple Bulk Pack (24) T568A/B RV6MJKUTR-S1 TIA Red Single Pack T568A/B RV6MJKUTR-S2 TIA Red Bulk Pack (24) T568A/B RV6MJKUTR-B24 TIA Red Bulk Pack (24) T568A/B RV6MJKUTR-B24 TIA Red Bulk Pack (24) T568A/B RV6MJKUTR-B24 TIA Yellow Single Pack T568A/B RV6MJKUTY-S1 TIA Yellow Bulk Pack (24) T568A/B RV6MJKUTY-B24 TIA Yellow Bulk Pack (24) T568A/B RV6MJKUTY-B24 TIA Yellow Bulk Pack (24) T568A/B RV6MJKUTY-B24 TIA Yellow Bulk Pack (24) T568A/B	RV6MJKUOR-S1	Orange	Single Pack	T568A/B
RV6MJKUPR-B24         Purple         Bulk Pack (24)         T568A/B           RV6MJKURD-S1         Red         Single Pack         T568A/B           RV6MJKURD-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKUTB-S1         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Blue         Bulk Pack (24)         T568A/B           RV6MJKUTN-S1         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-B24         TIA Brown         Bulk Pack (24)         T568A/B           RV6MJKUTG-S1         TIA Green         Single Pack         T568A/B           RV6MJKUTG-B24         TIA Orange         Single Pack         T568A/B           RV6MJKUTO-S1         TIA Orange         Single Pack         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-B24         TIA Red         Single Pack         T568A/B           RV6MJKUTY-S1         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         S	RV6MJKUOR-B24	Orange	Bulk Pack (24)	T568A/B
RV6MJKURD-S1         Red         Single Pack         T568A/B           RV6MJKURD-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKUTB-S1         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Blue         Bulk Pack (24)         T568A/B           RV6MJKUTN-S1         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-B24         TIA Brown         Bulk Pack (24)         T568A/B           RV6MJKUTG-S1         TIA Green         Single Pack         T568A/B           RV6MJKUTG-B24         TIA Orange         Single Pack         T568A/B           RV6MJKUTO-S1         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-B24         TIA Red         Single Pack         T568A/B           RV6MJKUTY-S1         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         <	RV6MJKUPR-S1	Purple	Single Pack	T568A/B
RV6MJKURD-B24         Red         Bulk Pack (24)         T568A/B           RV6MJKUTB-S1         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Blue         Bulk Pack (24)         T568A/B           RV6MJKUTN-S1         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-B24         TIA Brown         Bulk Pack (24)         T568A/B           RV6MJKUTG-S1         TIA Green         Single Pack         T568A/B           RV6MJKUTG-B24         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTO-S1         TIA Orange         Single Pack         T568A/B           RV6MJKUTD-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-S1         TIA Red         Single Pack         T568A/B           RV6MJKUTR-B24         TIA Red         Bulk Pack (24)         T568A/B           RV6MJKUTY-B24         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow	RV6MJKUPR-B24	Purple	Bulk Pack (24)	T568A/B
RV6MJKUTB-S1         TIA Blue         Single Pack         T568A/B           RV6MJKUTB-B24         TIA Blue         Bulk Pack (24)         T568A/B           RV6MJKUTN-S1         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-B24         TIA Brown         Bulk Pack (24)         T568A/B           RV6MJKUTG-S1         TIA Green         Single Pack         T568A/B           RV6MJKUTG-B24         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTO-B1         TIA Orange         Single Pack         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-S1         TIA Red         Single Pack         T568A/B           RV6MJKUTR-B24         TIA Red         Bulk Pack (24)         T568A/B           RV6MJKUTY-S1         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B	RV6MJKURD-S1	Red	Single Pack	T568A/B
RV6MJKUTB-B24         TIA Blue         Bulk Pack (24)         T568A/B           RV6MJKUTN-S1         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-B24         TIA Brown         Bulk Pack (24)         T568A/B           RV6MJKUTG-S1         TIA Green         Single Pack         T568A/B           RV6MJKUTG-B24         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTO-S1         TIA Orange         Single Pack         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-B24         TIA Red         Single Pack         T568A/B           RV6MJKUTY-S1         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B	RV6MJKURD-B24	Red	Bulk Pack (24)	T568A/B
RV6MJKUTN-S1         TIA Brown         Single Pack         T568A/B           RV6MJKUTN-B24         TIA Brown         Bulk Pack (24)         T568A/B           RV6MJKUTG-S1         TIA Green         Single Pack         T568A/B           RV6MJKUTG-B24         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTO-S1         TIA Orange         Single Pack         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-S1         TIA Red         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B	RV6MJKUTB-S1	TIA Blue	Single Pack	T568A/B
RV6MJKUTN-B24         TIA Brown         Bulk Pack (24)         T568A/B           RV6MJKUTG-S1         TIA Green         Single Pack         T568A/B           RV6MJKUTG-B24         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTO-S1         TIA Orange         Single Pack         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-S1         TIA Red         Single Pack         T568A/B           RV6MJKUTR-B24         TIA Red         Bulk Pack (24)         T568A/B           RV6MJKUTY-S1         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B           RV6MJKUTY-B25         TIA Yellow         Bulk Pack (24)         T568A/B	RV6MJKUTB-B24	TIA Blue	Bulk Pack (24)	T568A/B
RV6MJKUTG-B24 TIA Green Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Orange Single Pack T568A/B RV6MJKUTO-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTO-B24 TIA Orange Bulk Pack (24) T568A/B RV6MJKUTP-S1 TIA Purple Single Pack T568A/B RV6MJKUTP-B24 TIA Purple Bulk Pack (24) T568A/B RV6MJKUTR-S1 TIA Red Single Pack T568A/B RV6MJKUTR-B24 TIA Red Bulk Pack (24) T568A/B RV6MJKUTR-S1 TIA Red Bulk Pack (24) T568A/B RV6MJKUTY-S1 TIA Yellow Single Pack T568A/B RV6MJKUTY-B24 TIA Yellow Bulk Pack (24) T568A/B RV6MJKUTY-B24 TIA Yellow Bulk Pack (24) T568A/B RV6MJKUTY-B24 TIA Yellow Bulk Pack (24) T568A/B	RV6MJKUTN-S1	TIA Brown	Single Pack	T568A/B
RV6MJKUTG-B24         TIA Green         Bulk Pack (24)         T568A/B           RV6MJKUTO-S1         TIA Orange         Single Pack         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-S1         TIA Red         Single Pack         T568A/B           RV6MJKUTR-B24         TIA Red         Bulk Pack (24)         T568A/B           RV6MJKUTY-S1         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B	RV6MJKUTN-B24	TIA Brown	Bulk Pack (24)	T568A/B
RV6MJKUTO-S1         TIA Orange         Single Pack         T568A/B           RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-S1         TIA Red         Single Pack         T568A/B           RV6MJKUTR-B24         TIA Red         Bulk Pack (24)         T568A/B           RV6MJKUTY-S1         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B           RV6MJKUEW-S1         White         Single Pack         T568A/B	RV6MJKUTG-S1	TIA Green	Single Pack	T568A/B
RV6MJKUTO-B24         TIA Orange         Bulk Pack (24)         T568A/B           RV6MJKUTP-S1         TIA Purple         Single Pack         T568A/B           RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-S1         TIA Red         Single Pack         T568A/B           RV6MJKUTR-B24         TIA Red         Bulk Pack (24)         T568A/B           RV6MJKUTY-S1         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B           RV6MJKUEW-S1         White         Single Pack         T568A/B	RV6MJKUTG-B24	TIA Green	Bulk Pack (24)	T568A/B
RV6MJKUTP-S1 TIA Purple Single Pack T568A/B RV6MJKUTP-B24 TIA Purple Bulk Pack (24) T568A/B RV6MJKUTR-S1 TIA Red Single Pack T568A/B RV6MJKUTR-B24 TIA Red Bulk Pack (24) T568A/B RV6MJKUTY-S1 TIA Yellow Single Pack T568A/B RV6MJKUTY-B24 TIA Yellow Bulk Pack (24) T568A/B RV6MJKUTY-B24 TIA Yellow Bulk Pack (24) T568A/B RV6MJKUEW-S1 White Single Pack T568A/B	RV6MJKUTO-S1	TIA Orange	Single Pack	T568A/B
RV6MJKUTP-B24         TIA Purple         Bulk Pack (24)         T568A/B           RV6MJKUTR-S1         TIA Red         Single Pack         T568A/B           RV6MJKUTR-B24         TIA Red         Bulk Pack (24)         T568A/B           RV6MJKUTY-S1         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B           RV6MJKUEW-S1         White         Single Pack         T568A/B	RV6MJKUTO-B24	TIA Orange	Bulk Pack (24)	T568A/B
RV6MJKUTR-S1 TIA Red Single Pack T568A/B RV6MJKUTR-B24 TIA Red Bulk Pack (24) T568A/B RV6MJKUTY-S1 TIA Yellow Single Pack T568A/B RV6MJKUTY-B24 TIA Yellow Bulk Pack (24) T568A/B RV6MJKUEW-S1 White Single Pack T568A/B	RV6MJKUTP-S1	TIA Purple	Single Pack	T568A/B
RV6MJKUTR-B24         TIA Red         Bulk Pack (24)         T568A/B           RV6MJKUTY-S1         TIA Yellow         Single Pack         T568A/B           RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B           RV6MJKUEW-S1         White         Single Pack         T568A/B	RV6MJKUTP-B24	TIA Purple	Bulk Pack (24)	T568A/B
RV6MJKUTY-S1 TIA Yellow Single Pack T568A/B RV6MJKUTY-B24 TIA Yellow Bulk Pack (24) T568A/B RV6MJKUEW-S1 White Single Pack T568A/B	RV6MJKUTR-S1	TIA Red	Single Pack	T568A/B
RV6MJKUTY-B24         TIA Yellow         Bulk Pack (24)         T568A/B           RV6MJKUEW-S1         White         Single Pack         T568A/B	RV6MJKUTR-B24	TIA Red	Bulk Pack (24)	T568A/B
RV6MJKUEW-S1 White Single Pack T568A/B	RV6MJKUTY-S1	TIA Yellow	Single Pack	T568A/B
	RV6MJKUTY-B24	TIA Yellow	Bulk Pack (24)	T568A/B
RV6MJKUEW-B24 White Bulk Pack (24) T568A/B	RV6MJKUEW-S1	White	Single Pack	T568A/B
	RV6MJKUEW-B24	White	Bulk Pack (24)	T568A/B

RV6MJKUYL-S1	Yellow	Single Pack	T568A/B
RV6MJKUYL-B24	Yellow	Bulk Pack (24)	T568A/B

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#### METRIC MEASUREMENT VERSION



# AX101066 Modular Connectors - CAT6+ Modular Jack - MDVO style







For more Information please call

1-800-Belden1



# **General Description:**

CAT6+ Modular Jack, RJ45, MDVO style, Black

# **Usage (Overall)**

Suitable Applications:	IBDN System 2400 and 4800, TIA Category 6+, ISO Class E, 1000 BASE-T
Related Parts:	Compatible with Interface and MDVO Style Faceplates, Adapters, Boxes and Patch Panels

# **Physical Characteristics (Connectivity)**

#### **Dimensions**

#### **Dimensions:**

Height (mm)	Width (mm)	Depth (mm)
19.431	19.558	32.766

## Materials

#### Materials:

Description	Туре	Material
Front Connection	Lead Frame	Copper Allow with 50u inch Gold over Nickel
Rear Connection	IDC	Copper Allow with Nickel Plating
Connector Body		Plastic - UL940V-0

#### Color

Front Connection	Lead Frame	Copper Allow with 50u inch Gold over Nickel
Rear Connection	IDC	Copper Allow with Nickel Plating
Connector Body		Plastic - UL940V-0

# Color: Wiring Scheme

Wiring Scheme: T568A/B

# Weight

Weight: 0.006 kg

# **Included Parts**

**Included Parts:** 1 T-Bar +1 Dust Cap

# **Packaging**

Packaging: Individually packaged in a plastic bag. Standard pack of 50 units.

Black

# **Mechanical Characteristics (Connectivity)**

Footprint/Type: MDVO-Style Plug / Jack Compatibility: RJ45, RJ11

# Termination Interface:

Termination	Connection	Durabilities	
Front	Mated Connection	1,000 cycles	
Rear	Gas Tight IDC Connection	20 terminations	

Connector/Hardware Retention:	88.964 N
Plug/Connector Retention:	50.042 N
Storage Temperature Range:	-40°C To +70°C
Installation Temperature Range:	-10°C To +60°C

#### METRIC MEASUREMENT VERSION



#### AX101066 Modular Connectors - CAT6+ Modular Jack - MDVO style

**Operating Temperature Range:** -10°C To +60°C

Tool Compatibility: Belden 110 Connecting Tool, MediaFlex Termination Station

# **Applicable Specifications and Agency Compliance (Overall)**

## **Applicable Standards & Environmental Programs**

Other Standards:FCC Part 68, Subpart F, IEC 60603-7EU Directive 2002/95/EC (RoHS):YesEU RoHS Compliance Date (mm/dd/yyyy):07/01/2006MII Order #39 (China RoHS):EUP 50Telecommunications Standards:Category 6 - TIA 568.B.2-1, ISO/IEC 11801:2002 Ed.2Third Party Performance Verification:ETL - Verified Category 6

ACA, Bi-national Standard Listed

Suitability

Suitability - Indoor: Yes - Indoor

## **Transmission Characteristics (Connectivity)**

#### **Mated Connection Table 1:**

**Safety Listing:** 

Frequency (MHz)	Max. Insertion Loss TIA* (dB)	Max. Insertion Loss Belden** (dB)	Min. NEXT TIA* (dB)	Min. NEXT Belden** (dB)	Min. FEXT TIA* (dB)	Min. FEXT Belden** (dB)
1.000	0.100	0.100	75.000	77.000	75.000	77.000
4.000	0.100	0.100	75.000	77.000	71.100	75.100
8.000	0.100	0.100	75.000	77.000	65.000	69.000
10.000	0.100	0.100	74.000	77.000	63.100	67.100
16.000	0.100	0.100	69.900	72.900	59.000	63.000
20.000	0.100	0.100	68.000	71.000	57.100	61.100
25.000	0.100	0.100	66.000	69.000	55.100	59.100
31.250	0.110	0.100	64.100	67.100	53.200	57.200
62.500	0.160	0.120	58.100	61.100	47.200	51.200
100.000	0.200	0.160	54.000	57.000	43.100	47.100
200.000	0.280	0.240	48.000	51.000	37.100	41.100
250.000	0.320	0.280	46.000	49.000	35.100	39.100
300.000		0.310		44.500		37.600

**Mated Connection Table - Footnote:** 

## Mated Connection Table 2:

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden** (dB)	Min. Balanced TCL TIA* (dB)	Min. Balanced TCL Belden** (dB)
1.000	30.000	32.000	40.000	42.000
4.000	30.000	32.000	40.000	42.000
8.000	30.000	32.000	40.000	42.000
10.000	30.000	32.000	40.000	42.000
16.000	30.000	32.000	40.000	42.000
20.000	30.000	32.000	40.000	42.000
25.000	30.000	32.000	40.000	42.000
31.250	30.000	32.000	38.100	42.000
62.500	28.100	32.000	32.100	36.100
100.000	24.000	28.000	28.000	32.000
200.000	18.000	22.000	22.000	26.000
250.000	16.000	22.000	20.000	24.000
300.000		18.500		22.500

**Dielectric Strength:** 1,000 V RMS @ 60 Hz for 1 minute

Current Rating: 1.500 A

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<sup>\*</sup> TIA/EIA-568-B.2-1-2002 Category 6 Standard.

<sup>\*\*</sup> Worst-case performance for a CAT6+ mated connection using CAT6+ modular plugs.

#### METRIC MEASUREMENT VERSION



#### AX101066 Modular Connectors - CAT6+ Modular Jack - MDVO style

Insulation Resistance:	50 M-Ohm Minimum	
Max. Contact Resistance:	20 m-Ohm	
Termination Resistance:	2.5 m-Ohm	

## **Notes (Overall)**

Notes: Please see Installation Guide PX103329

#### **Product Family**

#### Part Number List:

Item Number	Color
AX101063	Gray
AX101064	Almond
AX101065	White
AX101066	Black
AX101067	Orange (TIA 606)
AX101068	Red (TIA 606)
AX101069	Yellow (TIA 606)
AX101070	Green (TIA 606)
AX101071	Blue (TIA 606)
AX101072	Purple (TIA 606)
AX101073	Brown (TIA 606)
AX102563	Ivory

## **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
AX101066	1 EA	0.011 KG			CAT6+ JACK MDVO BLACK

Revision Number: 1 Revision Date: 04-26-2013

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#### **METRIC MEASUREMENT VERSION**



# AX101321 Modular Connectors - CAT6+ Modular Jack - KeyConnect







For more Information please call

1-800-Belden1



#### **General Description:**

CAT6+ Modular Jack, RJ45, KeyConnect style, Black

## Usage (Overall)

Suitable Applications:	IBDN System 2400 and 4800, TIA Category 6+, ISO Class E, 1000 BASE-T		
Related Parts:	Compatible with KeyConnect Faceplates, Adapters, Boxes and Patch Panels		

#### **Physical Characteristics (Connectivity)**

#### Dimensions

#### Dimensions:

Height (mm)	Width (mm)	Depth (mm)
22.352	16.256	32.766

#### Materials

#### Materials:

Description	Туре	Material
Front Connection	Lead Frame	Copper Allow with 50u inch Gold over Nickel
Rear Connection	IDC	Copper Allow with Nickel Plating
Connector Body		Plastic - UL940V-0

#### C

	Rear Connection Connector Body	IDC	Copper Allow with Nickel Plating Plastic - UL940V-0
olo	,		

# Color: Wiring Scheme

Wiring Scheme: T568A/B

## Weight

Weight: 0.006 kg

#### **Included Parts**

Included Parts: 1 T-Bar

Durabilities

1,000 cycles

# **Packaging**

Packaging: Individually packaged in a plastic bag. Standard pack of 50 units.

Black

## **Mechanical Characteristics (Connectivity)**

Mated Connection

Footprint/Type: KeyConnect Plug / Jack Compatibility: RJ45, RJ11

### Termination Interface:

**Termination Connection** 

**Tool Compatibility:** 

Rear Gas Tight IDC Connection 20 termination	S	
Connector/Hardware Retention:	88.964 N	
Plug/Connector Retention:	50.042 N	
Storage Temperature Range:	-40°C To +70°C	
Installation Temperature Range:	-10°C To +60°C	
Operating Temperature Range:	-10°C To +60°C	

## **Applicable Specifications and Agency Compliance (Overall)**

#### **Applicable Standards & Environmental Programs**

Other Standards:	FCC Part 68, Subpart F, IEC 60603-7	
EU Directive 2002/95/EC (RoHS):	Yes	
EU RoHS Compliance Date (mm/dd/yyyy):	07/01/2006	
MII Order #39 (China RoHS):	EUP 50	

Belden 110 Connecting Tool, MediaFlex Termination Station

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#### **METRIC MEASUREMENT VERSION**



# AX101321 Modular Connectors - CAT6+ Modular Jack - KeyConnect

Telecommunications Standards:	Category 6 - TIA 568.B.2-1, ISO/IEC 11801:2002 Ed.2	
Third Party Performance Verification:	ETL - Verified Category 6	
Safety Listing:	ACA, Bi-national Standard Listed	
Suitability		
Suitability - Indoor:	Yes - Indoor	

## **Transmission Characteristics (Connectivity)**

#### Mated Connection Table 1:

Frequency (MHz)	Max. Insertion Loss TIA* (dB)	Max. Insertion Loss Belden** (dB)	Min. NEXT TIA* (dB)	Min. NEXT Belden** (dB)	Min. FEXT TIA* (dB)	Min. FEXT Belden** (dB)
1.000	0.100	0.100	75.000	77.000	75.000	77.000
4.000	0.100	0.100	75.000	77.000	71.100	75.100
8.000	0.100	0.100	75.000	77.000	65.000	69.000
10.000	0.100	0.100	74.000	77.000	63.100	67.100
16.000	0.100	0.100	69.900	72.900	59.000	63.000
20.000	0.100	0.100	68.000	71.000	57.100	61.100
25.000	0.100	0.100	66.000	69.000	55.100	59.100
31.250	0.110	0.100	64.100	67.100	53.200	57.200
62.500	0.160	0.120	58.100	61.100	47.200	51.200
100.000	0.200	0.160	54.000	57.000	43.100	47.100
200.000	0.280	0.240	48.000	51.000	37.100	41.100
250.000	0.320	0.280	46.000	49.000	35.100	39.100
300.000		0.310		44.500		37.600

Mated Connection Table - Footnote:

#### Mated Connection Table 2:

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden** (dB)		Min. Balanced TCL Belden** (dB)
1.000	30.000	32.000	40.000	42.000
4.000	30.000	32.000	40.000	42.000
8.000	30.000	32.000	40.000	42.000
10.000	30.000	32.000	40.000	42.000
16.000	30.000	32.000	40.000	42.000
20.000	30.000	32.000	40.000	42.000
25.000	30.000	32.000	40.000	42.000
31.250	30.000	32.000	38.100	42.000
62.500	28.100	32.000	32.100	36.100
100.000	24.000	28.000	28.000	32.000
200.000	18.000	22.000	22.000	26.000
250.000	16.000	22.000	20.000	24.000
300.000		18.500		22.500

1,000 V RMS @ 60 Hz for 1 minute Dielectric Strength:

Current Rating:	1.500 A
Insulation Resistance:	500 M-Ohm Minimum
Max. Contact Resistance:	20 m-Ohm
Termination Resistance:	2.5 m-Ohm

#### Notes (Overall)

Notes: Please see Installation Guide PX103329

Notes (Cont'd.): IDC Wire Gauge: 22~24 AWG

**Product Family** 

## Part Number List:

Item Number	Color
AX101318	Gray
AX101319	Almond
AX101320	Elec. White
AX101321	Black
AX101322	Orange (TIA 606)
AX101323	Red (TIA 606)
AX101324	Yellow (TIA 606)
AX101325	Green (TIA 606)

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<sup>\*</sup> TIA/EIA-568-C.2-1-2002 Category 6 Standard.
\*\* Worst-case performance for a CAT6+ mated connection using CAT6+ modular plugs.

#### **METRIC MEASUREMENT VERSION**



# AX101321 Modular Connectors - CAT6+ Modular Jack - KeyConnect

AX101326	Blue (TIA 606)
AX101327	Purple (TIA 606)
AX101328	Brown (TIA 606)
AX103076	Ivory
AX104189	Orange
AX104190	Red
AX104191	Yellow
AX104192	Green
AX104193	Blue
AX104194	Purple

#### **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
AX101321	1 EA	0.011 KG			CAT6+ JACK KCONN BLACK

Revision Number: 1 Revision Date: 08-12-2014

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**ENGLISH MEASUREMENT VERSION** 



# RVAPPF1U24BK-P Faceplates and Panels - 10GX REVConnect Patch Panel, Flat 1U24-Port Printed

## **Preview Document. Not Live Data.**

For more Information please call

1-800-Belden1



# **Description**

10GX REVConnect Patch Panel, 24-Port, 1U (Preloaded & Printed)

#### Usage (Overall):

Suitable Applications	10GX Systems, TIA Category 6A, ISO Class EA, 10GBASE-T	
Related Parts	10GX REVConnect Modular Jacks, 10GX Modular Cords	

## **Physical Characteristics (Connectivity):**

#### Capacity:

Max. Capacity 24 connectors (preloaded)

### Access:

Front Connection	Flush
Termination Area	Front and Rear

#### **Dimensions:**

**Dimensions** 

Height (in.)	Width (in.)	Depth (in.)
1.730	19.000	2.000

## Materials:

Materials

Description	Material	Color
Panel	Steel	Black
Frame	PC/ABS	Black
Management Bar	Steel	Black
Clear Window	Polycarbonate	Transparent

### Color:

Color	Black, white	
Weight:		

# Included Parts:

Packaging

Weight:

Included Parts

24 10GX REVConnect Jacks Black; 25 REVConnect Cable Managers and Term; 4 Cle
Windows; 1 Rear Cable Management Bar; 4 Screws (10x32); 4 Screws (12x24); 2
Velcro Straps; 4 Frames; 1 Installation Guide

1.846 lbs.

Packaging:

# **Mechanical Characteristics (Connectivity):**

Footprint/Type	KeyConnect
Plug / Jack Compatibility	RJ45

Individually packaged in a cardboard box.

Termination Interface

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# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



# RVAPPF1U24BK-P Faceplates and Panels - 10GX REVConnect Patch Panel, Flat 1U24-Port Printed

Termination	Connection	Durabilities
Front	Mated Connection	750 cycles
Rear	Mated Connection	200 cycles

Cable/Connector Retention:	15 lbs.
Connector/Hardware Retention:	20 lbs.
Plug/Connector Retention:	11.250 lbs.
Storage Temperature Range	-40°C To +70°C
Installation Temperature Range	-10°C To +60°C
Operating Temperature Range	-10°C To +60°C
Tool Compatibility	REVConnect Termination Tool (RVUTT01)

# **Applicable Specifications and Agency Compliance (Overall):**

**Applicable Standards & Environmental Programs:** 

UL Rating	UL94 V-0
EU Directive 2011/65/EU (ROHS II)	Yes
IEEE Specification	Power Over Ethernet (PoE) IEEE 802.3at type 1 and 2 (up to 30W), IEEE802.3bt/D1.7 type 3 and 4 (up to 100W), CISCO UPOE (up to 60W), Power over HDBaseTTM (up to 100W)
EU RoHS Compliance Date (mm/dd/yyyy)	07/01/2006
MII Order #39 (China RoHS)	EUP 50
Telecommunications Standards	Category 6A - ISO/IEC 11801:2002 Ed.2, TIA 568.2-D
Safety Listing	c(UL)us Listed
Other Specification	UL 1863, IEC 60603-7, FCC part 68-F
<b>Suitability:</b> Suitability - Indoor	Yes

# **Transmission Characteristics (Connectivity):**

#### Mated Connection Table 1

Frequency (MHz)		Max. Insertion Loss Belden** (dB)		Min. NEXT Belden** (dB)	Min. FEXT TIA* (dB)	Min. FEXT Belden** (dB)
1.000	0.100	0.050	75.000	77.000	75.000	80.000
4.000	0.100	0.050	75.000	77.000	71.100	75.100
8.000	0.100	0.050	75.000	77.000	65.000	69.000
10.000	0.100	0.050	74.000	77.000	63.100	67.100
16.000	0.100	0.060	69.900	72.900	59.000	63.000
20.000	0.100	0.070	68.000	71.000	57.100	61.100
25.000	0.100	0.080	66.000	69.000	55.100	59.100
31.250	0.110	0.090	64.100	67.100	53.200	57.200
62.500	0.160	0.140	58.100	61.100	47.200	51.200
100.000	0.200	0.180	54.000	57.000	43.100	47.100
200.000	0.280	0.260	48.000	51.000	37.100	41.100
250.000	0.320	0.300	46.000	49.000	35.100	39.100
300.000	0.350	0.330	42.900	46.700	33.600	37.600
400.000	0.400	0.380	37.900	42.900	31.100	35.100
500.000	0.450	0.430	34.000	40.000	29.100	33.100
625.000		0.480		37.100		31.200

Mated Connection Table - Footnote

\* TIA/EIA-568.2-D Category 6A Standard. \*\* Worst-case performance for a 10GX mate connection using 10GX modular plugs.

## Mated Connection Table 2

Frequency	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.
(MHz)	Return Loss	Return Loss	PSANEXT	PSANEXT	PSAACRF	PSAACRF	Balanced TCL	Balanced TCL
	TIA* (dB)	Belden** (dB)	TIA* (dB)	Belden** (dB)	TIA* (dB)	Belden** (dB)	TIA* (dB)	Belden** (dB)

**ENGLISH MEASUREMENT VERSION** 



## RVAPPF1U24BK-P Faceplates and Panels - 10GX REVConnect Patch Panel, Flat 1U24-Port Printed

1.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
4.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
8.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
10.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
16.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
20.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
25.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
31.250	30.000	34.100	70.500	72.000	67.000	72.000	38.100	45.000
62.500	30.000	34.100	70.500	72.000	67.000	72.000	32.100	39.100
100.000	28.000	30.000	70.500	72.000	67.000	72.000	28.000	35.000
200.000	22.000	24.000	64.500	66.000	61.000	66.000	22.000	29.000
250.000	20.000	22.000	62.500	64.000	59.000	64.000	20.000	27.000
300.000	18.500	20.500	61.000	62.500	57.500	62.500	18.500	25.500
400.000	16.000	18.000	58.500	60.000	55.000	60.000	16.000	23.000
500.000	14.000	16.000	56.500	58.000	53.000	58.000	14.000	21.000
625.000		13.000		56.100		56.100		19.100

Dielectric Strength 1,000 V RMS @ 60 Hz for 1 minute (Signals to Ground)

Current Rating:	1.300 A
Insulation Resistance	500 M-Ohm Minimum
Max. Contact Resistance	20 m-Ohm
Termination Resistance	2.5 m-Ohm

## Notes (Overall):

Notes For proper installation refer to Installation Guide PX106520 included with the product or visit our web site at http://www.belden.com

Notes (Cont'd.)

Cable Range

- Min: 24 AWG Max: Cable 22 AWG Solid and Stranded
- Insulation Dia. Min: .035 in. (.89 mm) Max: .053 in. (1.34 mm)
- Outer Jacket Dia. Max: .366 in. (9.3 mm)

#### **Product Family:**

Part Numbers

Item Number	Description
RVAPPF1U24BK-P	10GX REVConnect Patch Panel 24-port, 1U, Black (Preloaded-Printed)
RVAPPA1U24BK-P	10GX REVConnect Angled Patch Panel 24-port, 1U, Black (Preloaded-Printed)
RVAPPF2U48BK-P	10GX REVConnect Patch Panel 48-port, 2U, Black (Preloaded-Printed)
RVAPPA2U48BK-P	10GX REVConnect Angled Patch Panel 48-port, 2U, Black (Preloaded-Printed)

Revision Number: 0 Revision Date: 02-10-2021

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**ENGLISH MEASUREMENT VERSION** 



# RVAPPF2U48BK-P Faceplates and Panels - 10GX REVConnect Patch Panel, Flat 2U48-Port Printed

# **Preview Document. Not Live Data.**

For more Information please call

1-800-Belden1



# **Description**

10GX REVConnect Patch Panel, 48-Port, 2U (Preloaded & Printed)

# Usage (Overall):

Suitable Applications	10GX Systems, TIA Category 6A, ISO Class EA, 10GBASE-T
Related Parts	10GX REVConnect Modular Jacks, 10GX Modular Cords

# **Physical Characteristics (Connectivity):**

#### Capacity:

Max. Capacity 48 connectors (preloaded)

### Access:

Front Connection	Flush
Termination Area	Front and Rear

#### **Dimensions:**

Dimensions

Height (in.)	Width (in.)	Depth (in.)
3.470	19.000	2.000

## Materials:

Materials

Description	Material	Color
Panel	Steel	Black
Frame	PC/ABS	Black
Management Bar	Steel	Black
Clear Window	Polycarbonate	Transparent

#### Color: Color

<b>Weight:</b> Weight:	3.083 lbs.
Included Parts: Included Parts	48 10GX REVConnect Jacks Black; 50 REVConnect Cores; 8 Clear Windows; 2 Rear Cable Management Bar; 4 Screws (10x32); 4 Screws (12x24); 2 Velcro Straps; 4 Frames; 1 Installation Guide

Black

# Packaging:

Packaging Individually packaged in a cardboard box.

## **Mechanical Characteristics (Connectivity):**

Footprint/Type	KeyConnect
Plug / Jack Compatibility	RJ45

Termination Interface

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# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



# RVAPPF2U48BK-P Faceplates and Panels - 10GX REVConnect Patch Panel, Flat 2U48-Port Printed

Termination	Connection	Durabilities
Front	Mated Connection	750 cycles
Rear	Mated Connection	200 cycles

Cable/Connector Retention:	15 lbs.
Connector/Hardware Retention:	20 lbs.
Plug/Connector Retention:	11.250 lbs.
Storage Temperature Range	-40°C To +70°C
Installation Temperature Range	-10°C To +60°C
Operating Temperature Range	-10°C To +60°C
Tool Compatibility	REVConnect Termination Tool (RVUTT01)

# **Applicable Specifications and Agency Compliance (Overall):**

**Applicable Standards & Environmental Programs:** 

UL Rating	UL94 V-0
EU Directive 2011/65/EU (ROHS II)	Yes
IEEE Specification	Power Over Ethernet (PoE) IEEE 802.3at type 1 and 2 (up to 30W), IEEE802.3bt/D1.7 type 3 and 4 (up to 100W), CISCO UPOE (up to 60W), Power over HDBaseTTM (up to 100W)
EU RoHS Compliance Date (mm/dd/yyyy)	07/01/2006
MII Order #39 (China RoHS)	EUP 50
Telecommunications Standards	Category 6A - ISO/IEC 11801:2002 Ed.2, TIA 568.2-D
Safety Listing	c(UL)us Listed
Other Specification	UL 1863, IEC 60603-7, FCC part 68-F
Guitability: Suitability - Indoor	Yes

# **Transmission Characteristics (Connectivity):**

#### Mated Connection Table 1

Frequency (MHz)	Max. Insertion Loss TIA* (dB)			Min. NEXT Belden** (dB)	Min. FEXT TIA* (dB)	Min. FEXT Belden** (dB)
1.000	0.100	0.050	75.000	77.000	75.000	80.000
4.000	0.100	0.050	75.000	77.000	71.100	75.100
8.000	0.100	0.050	75.000	77.000	65.000	69.000
10.000	0.100	0.050	74.000	77.000	63.100	67.100
16.000	0.100	0.060	69.900	72.900	59.000	63.000
20.000	0.100	0.070	68.000	71.000	57.100	61.100
25.000	0.100	0.080	66.000	69.000	55.100	59.100
31.250	0.110	0.090	64.100	67.100	53.200	57.200
62.500	0.160	0.140	58.100	61.100	47.200	51.200
100.000	0.200	0.180	54.000	57.000	43.100	47.100
200.000	0.280	0.260	48.000	51.000	37.100	41.100
250.000	0.320	0.300	46.000	49.000	35.100	39.100
300.000	0.350	0.330	42.900	46.700	33.600	37.600
400.000	0.400	0.380	37.900	42.900	31.100	35.100
500.000	0.450	0.430	34.000	40.000	29.100	33.100
625.000		0.480		37.100		31.200

Mated Connection Table - Footnote

\* TIA/EIA-568.2-D Category 6A Standard. \*\* Worst-case performance for a 10GX mate connection using 10GX modular plugs.

## Mated Connection Table 2

Frequency	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.
(MHz)	Return Loss	Return Loss	PSANEXT	PSANEXT	PSAACRF	PSAACRF	Balanced TCL	Balanced TCL
	TIA* (dB)	Belden** (dB)	TIA* (dB)	Belden** (dB)	TIA* (dB)	Belden** (dB)	TIA* (dB)	Belden** (dB)

**ENGLISH MEASUREMENT VERSION** 



## RVAPPF2U48BK-P Faceplates and Panels - 10GX REVConnect Patch Panel, Flat 2U48-Port Printed

1.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
4.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
8.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
10.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
16.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
20.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
25.000	30.000	34.100	70.500	72.000	67.000	72.000	40.000	45.000
31.250	30.000	34.100	70.500	72.000	67.000	72.000	38.100	45.000
62.500	30.000	34.100	70.500	72.000	67.000	72.000	32.100	39.100
100.000	28.000	30.000	70.500	72.000	67.000	72.000	28.000	35.000
200.000	22.000	24.000	64.500	66.000	61.000	66.000	22.000	29.000
250.000	20.000	22.000	62.500	64.000	59.000	64.000	20.000	27.000
300.000	18.500	20.500	61.000	62.500	57.500	62.500	18.500	25.500
400.000	16.000	18.000	58.500	60.000	55.000	60.000	16.000	23.000
500.000	14.000	16.000	56.500	58.000	53.000	58.000	14.000	21.000
625.000		13.000		56.100		56.100		19.100

Dielectric Strength 1,000 V RMS @ 60 Hz for 1 minute (Signals to Ground)

Current Rating:	1.300 A
Insulation Resistance	500 M-Ohm Minimum
Max. Contact Resistance	20 m-Ohm
Termination Resistance	2.5 m-Ohm

## Notes (Overall):

Notes For proper installation refer to Installation Guide PX106520 included with the product or visit our web site at http://www.belden.com

Notes (Cont'd.)

Cable Range

- Min: 24 AWG Max: Cable 22 AWG Solid and Stranded
- Insulation Dia. Min: .035 in. (.89 mm) Max: .053 in. (1.34 mm)
- Outer Jacket Dia. Max: .366 in. (9.3 mm)

#### **Product Family:**

Part Numbers

Item Number	Description
RVAPPF1U24BK-P	10GX REVConnect Patch Panel 24-port, 1U, Black (Preloaded-Printed)
RVAPPA1U24BK-P	10GX REVConnect Angled Patch Panel 24-port, 1U, Black (Preloaded-Printed)
RVAPPF2U48BK-P	10GX REVConnect Patch Panel 48-port, 2U, Black (Preloaded-Printed)
RVAPPA2U48BK-P	10GX REVConnect Angled Patch Panel 48-port, 2U, Black (Preloaded-Printed)

Revision Number: 0 Revision Date: 02-10-2021

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**ENGLISH MEASUREMENT VERSION** 



# RV6PPF1U24BK-P Faceplates and Panels - CAT6+ REVConnect Patch Panel, Flat 1U24-Port Printed

# **Preview Document. Not Live Data.**

For more Information please call

1-800-Belden1





# **Description**

CAT6+ REVConnect Patch Panel, Flat, 24-Port, 1U, Black (Preloaded & Printed)

# Usage (Overall):

Suitable Applications	2400, 3600, 4800 Systems, TIA Category 6, ISO Class E, 1GBASE-T
Related Parts	CAT6+ REVConnect Jacks, CAT6+ Modular Cords

# **Physical Characteristics (Connectivity):**

#### Capacity:

Max. Capacity 24 connectors (preloaded)

## Access:

Front Connection	Flush
Termination Area	Front and Rear

#### **Dimensions:**

**Dimensions** 

Height (in.)	Width (in.)	Depth (in.)
1.730	19.000	2.000

#### Materials:

Materials

Description	Material	Color
Panel	Steel	Black
Frame	PC/ABS	Black
Management Bar	Steel	Black
Clear Window	Polycarbonate	Transparent

# Weight:

Weight: 1.846 lbs.

## **Included Parts:**

included Parts	24 Galot Rev Connect Jacks Black preloaded, 4 Screws (10x32), 4 Screws (12x24), 2
	Velcro Straps; 4 Clear Windows; 1 Rear Cable Management Bar; 1 Installation Guide

# Packaging:

Packaging Individually packaged in a cardboard box.

## **Mechanical Characteristics (Connectivity):**

Footprint/Type	KevConnect
Footbrint/Tybe	ReyConnect

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# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



# RV6PPF1U24BK-P Faceplates and Panels - CAT6+ REVConnect Patch Panel, Flat 1U24-Port Printed

RJ45 Plug / Jack Compatibility

Termination Interface

Termination	Connection	Durabilities
Front	Mated Connection	750 cycles
Rear	Mated Connection	200 cycles

Cable/Connector Retention:	15 lbs.
Connector/Hardware Retention:	20 lbs.
Plug/Connector Retention:	11.250 lbs.
Storage Temperature Range	-40°C To +70°C
Installation Temperature Range	-10°C To +60°C
Operating Temperature Range	-10°C To +60°C
Tool Compatibility	REVConnect Termination Tool (RVUTT01)

# Applicable Specifications and Agency Compliance (Overall):

**Applicable Standards & Environmental Programs:** 

UL Rating	UL94V-0
IEEE Specification	Power Over Ethernet (PoE) IEEE 802.3at type 1 and 2 (up to 30W), IEEE802.3bt/D1.7 type 3 and 4 (up to 100W), CISCO UPOE (up to 60W), Power over HDBase TTM (up to 100W)
EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	07/01/2006
MII Order #39 (China RoHS)	EUP 50
Telecommunications Standards	Category 6 - ISO/IEC 11801:2002 Ed.2, TIA 568.2-D
Safety Listing	c(UL)us Listed
Other Specification	UL 1863, IEC 60603-7, FCC part 68-F
Suitability: Suitability - Indoor	Yes

# **Transmission Characteristics (Connectivity):**

#### Mated Connection Table 1

Frequency (MHz)		Max. Insertion Loss Belden** (dB)		Min. NEXT Belden** (dB)	Min. FEXT TIA* (dB)	Min. FEXT Belden** (dB)
1.000	0.100	0.100	75.000	77.000	75.000	77.000
4.000	0.100	0.100	75.000	77.000	71.100	75.100
8.000	0.100	0.100	75.000	77.000	65.000	69.000
10.000	0.100	0.100	74.000	77.000	63.100	67.100
16.000	0.100	0.100	69.900	72.900	59.000	63.000
20.000	0.100	0.100	68.000	71.000	57.100	61.100
25.000	0.100	0.100	66.000	69.000	55.100	59.100
31.250	0.110	0.100	64.100	67.100	53.200	57.200
62.500	0.160	0.120	58.100	61.100	47.200	51.200
100.000	0.200	0.160	54.000	57.000	43.100	47.100
200.000	0.280	0.240	48.000	51.000	37.100	41.100
250.000	0.320	0.280	46.000	49.000	35.100	39.100
300.000		0.310		44.500		37.600

Mated Connection Table - Footnote

\* TIA/EIA-568.2-D Category 6 Standard. \*\* Worst-case performance for a CAT6+ mateconnection using CAT6+ modular plugs.

## Mated Connection Table 2

- 1		Return Loss		Balanced TCL	Min. Balanced TCL Belden** (dB)
- 1	1.000	30.000	34.100	40.000	42.000

ENGLISH MEASUREMENT VERSION



## RV6PPF1U24BK-P Faceplates and Panels - CAT6+ REVConnect Patch Panel, Flat 1U24-Port Printed

4.000	30.000	34.100	40.000	42.000
8.000	30.000	34.100	40.000	42.000
10.000	30.000	34.100	40.000	42.000
16.000	30.000	34.100	40.000	42.000
20.000	30.000	34.100	40.000	42.000
25.000	30.000	34.100	40.000	42.000
31.250	30.000	34.100	38.100	42.000
62.500	30.000	34.100	32.100	36.100
100.000	28.000	30.000	28.000	32.000
200.000	22.000	24.000	22.000	26.000
250.000	20.000	22.000	20.000	24.000
300.000	18.500	20.500		22.500

Dielectric Strength	1,000 V RMS @ 60 Hz for 1 minute (Signals to Ground)
Current Rating:	1.300 A
Insulation Resistance	500 M-Ohm Minimum
Max. Contact Resistance	20 m-Ohm
Termination Resistance	2.5 m-Ohm

## Notes (Overall):

For proper installation refer to Installation Guide PX106520 included with the product or visit our web site at http://www.belden.com Notes

Notes (Cont'd.)

Cable Range

- Min: 24 AWG Max: Cable 22 AWG Solid and Stranded
- Insulation Dia. Min: .035 in. (.89 mm) Max: .053 in. (1.34 mm)
- Outer Jacket Dia. Max: .366 in. (9.3 mm)

#### **Product Family:**

Part Numbers

Item Number	Description
RV6PPF1U24BK-P	CAT6+ REVConnect Patch Panel Flat 1U24-Port, Black (Preloaded-Printed)
RV6PPA1U24BK-P	CAT6+ REVConnect Patch Panel Angled 1U24-Port, Black (Preloaded-Printed)
RV6PPF2U48BK-P	CAT6+ REVConnect Patch Panel Flat 2U48-Port, Black (Preloaded-Printed)
RV6PPA2U48BK-P	CAT6+ REVConnect Patch Panel Angled 2U48-Port, Black (Preloaded-Printed)

Revision Date: 02-10-2021 Revision Number: 0

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**ENGLISH MEASUREMENT VERSION** 



# RV6PPF2U48BK-P Faceplates and Panels - CAT6+ REVConnect Patch Panel, Flat 2U48-Port Printed

# **Preview Document. Not Live Data.**



For more Information please call

1-800-Belden1



# **Description**

CAT6+ REVConnect Patch Panel, Flat, 48-Port, 2U (Preloaded & Printed)

	/Overall):
usaue	(Overall):
	(

Suitable Applications	2400, 3600, 4800 Systems, TIA Category 6, ISO Class E, 1GBASE-T
Related Parts	CAT6+ REVConnect Jacks, CAT6+ Modular Cords

# **Physical Characteristics (Connectivity):**

Capacity:

Max. Capacity 48 connectors (preloaded)

Access:

Front Connection	Flush
Termination Area	Front and Rear

#### **Dimensions:**

Dimensions

Height (in.)	Width (in.)	Depth (in.)
3.470	19.000	2.000

#### Materials:

Materials

Description	Material	Color
Panel	Steel	Black
Frame	PC/ABS	Black
Management Bar	Steel	Black
Clear Window	Polycarbonate	Transparent

Color:

Color	Black, White

Weight:

Weight: 3.083 lbs.

**Included Parts:** 

Included Parts 48 Cat6+ REVConnect Jacks Black preloaded; 50 REVConnnect Cores; 4 Screws (10x32); 4 Screws (12x24); 2 Velcro Straps; 8 Clear Windows; 2 Rear Cable

Management Bar; 1 Installation Guide

Packaging:

Packaging Individually packaged in a cardboard box.

Page 1 of 3 02-10-2021

# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



# RV6PPF2U48BK-P Faceplates and Panels - CAT6+ REVConnect Patch Panel, Flat 2U48-Port Printed

## **Mechanical Characteristics (Connectivity):**

KeyConnect Footprint/Type RJ45 Plug / Jack Compatibility

# Termination Interface

**Tool Compatibility** 

ı ermir	nation inter	race	
	Termination	Connection	Durabilities
[	Front	Mated Connection	750 cycles
[	Rear	Mated Connection	200 cycles
Cable/	Connector	Retention:	
Conne	ctor/Hardw	are Retention:	
Plug/C	Connector F	Retention:	
Storag	je Tempera	ture Range	
Installa	ation Temp	erature Range	
Opera	ting Tempe	rature Range	

REVConnect Termination Tool (RVUTT01)

# Applicable Specifications and Agency Compliance (Overall):

## **Applicable Standards & Environmental Programs:**

UL Rating	UL94V-0
IEEE Specification	Power Over Ethernet (PoE) IEEE 802.3at type 1 and 2 (up to 30W), IEEE802.3bt/D1.7 type 3 and 4 (up to 100W), CISCO UPOE (up to 60W), Power over HDBase TTM (up to 100W)
EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	07/01/2006
MII Order #39 (China RoHS)	EUP 50
Telecommunications Standards	Category 6 - ISO/IEC 11801:2002 Ed.2, TIA 568.2-D
Safety Listing	c(UL)us Listed
Other Specification	UL 1863, IEC 60603-7, FCC part 68-F
<b>Suitability:</b> Suitability - Indoor	Yes

# **Transmission Characteristics (Connectivity):**

#### Mated Connection Table 1

S

Frequency (MHz)		Max. Insertion Loss Belden** (dB)		Min. NEXT Belden** (dB)	Min. FEXT TIA* (dB)	Min. FEXT Belden** (dB)
1.000	0.100	0.100	75.000	77.000	75.000	77.000
4.000	0.100	0.100	75.000	77.000	71.100	75.100
8.000	0.100	0.100	75.000	77.000	65.000	69.000
10.000	0.100	0.100	74.000	77.000	63.100	67.100
16.000	0.100	0.100	69.900	72.900	59.000	63.000
20.000	0.100	0.100	68.000	71.000	57.100	61.100
25.000	0.100	0.100	66.000	69.000	55.100	59.100
31.250	0.110	0.100	64.100	67.100	53.200	57.200
62.500	0.160	0.120	58.100	61.100	47.200	51.200
100.000	0.200	0.160	54.000	57.000	43.100	47.100
200.000	0.280	0.240	48.000	51.000	37.100	41.100
250.000	0.320	0.280	46.000	49.000	35.100	39.100
300.000		0.310		44.500		37.600

Mated Connection Table - Footnote

Mated Connection Table 2

<sup>\*</sup> TIA/EIA-568.2-D Category 6 Standard. \*\* Worst-case performance for a CAT6+ mateconnection using CAT6+ modular plugs.

**ENGLISH MEASUREMENT VERSION** 



## RV6PPF2U48BK-P Faceplates and Panels - CAT6+ REVConnect Patch Panel, Flat 2U48-Port Printed

Frequency (MHz)		Min. Return Loss Belden** (dB)	Min. Balanced TCL TIA* (dB)	Min. Balanced TCL Belden** (dB)
1.000	30.000	34.100	40.000	42.000
4.000	30.000	34.100	40.000	42.000
8.000	30.000	34.100	40.000	42.000
10.000	30.000	34.100	40.000	42.000
16.000	30.000	34.100	40.000	42.000
20.000	30.000	34.100	40.000	42.000
25.000	30.000	34.100	40.000	42.000
31.250	30.000	34.100	38.100	42.000
62.500	30.000	34.100	32.100	36.100
100.000	28.000	30.000	28.000	32.000
200.000	22.000	24.000	22.000	26.000
250.000	20.000	22.000	20.000	24.000
300.000	18.500	20.500		22.500

Dielectric Strength	1,000 V RMS @ 60 Hz for 1 minute (Signals to Ground)
Current Rating:	1.300 A
Insulation Resistance	500 M-Ohm Minimum
Max. Contact Resistance	20 m-Ohm
Termination Resistance	2.5 m-Ohm

## Notes (Overall):

For proper installation refer to Installation Guide PX106520 included with the product or visit our web site at http://www.belden.com Notes

Notes (Cont'd.)

- Cable Range • Min: 24 AWG Max: Cable 22 AWG Solid and Stranded
- Insulation Dia. Min: .035 in. (.89 mm) Max: .053 in. (1.34 mm)
- Outer Jacket Dia. Max: .366 in. (9.3 mm)

## **Product Family:**

Part Numbers

Item Number	Description
RV6PPF1U24BK-P	CAT6+ REVConnect Patch Panel Flat 1U24-Port, Black (Preloaded-Printed)
RV6PPA1U24BK-P	CAT6+ REVConnect Patch Panel Angled 1U24-Port, Black (Preloaded-Printed)
RV6PPF2U48BK-P	CAT6+ REVConnect Patch Panel Flat 2U48-Port, Black (Preloaded-Printed)
RV6PPA2U48BK-P	CAT6+ REVConnect Patch Panel Angled 2U48-Port, Black (Preloaded-Printed)

Revision Date: 02-10-2021 Revision Number: 0

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Part Number: 10GXS13

CAT6A 10GX Small Diameter, 4pr, UTP, LS-PVC Jkt, CMP

#### **Product Description**

CAT6A Enhanced (625MHz), 4-Unbonded-Pair, Plenum-CMP 105C OR CMP-LP (0.7A) OR CL3P-LP (0.7A), Premise Horizontal cable, 23 AWG Solid Bare Copper conductors, FEP insulation, patented EquiSpline™ & EquiBlock™ Technologies, ripcord, Flamarrest® jacket

#### **Technical Specifications**

#### **Product Overview**

Environmental Space:	Plenum
Suitable Applications:	Premise Horizontal Cable, 10 Gigabit Ethernet, Wireless, WIFI, 100BaseTX, 100BaseVG ANYLAN, 155ATM, 622ATM, NTSC/PAL Component or Composite Video, AES/EBU Digital Audio, AES51, RS-422, Noisy Environments, PoE, PoE Plus

#### **Physical Characteristics (Overall)**

#### Conductor

AWG	Stranding	Material	No. of Pairs
23	Solid	BC - Bare Copper	4
Condu	ctor Count:		8
Total I	Number of P	airs:	4

#### Insulation

Material
FEP - Fluorinated Ethylene Propylene

#### **Color Chart**

Number	Color
1	White & Blue
2	White & Orange
3	White & Green
4	White & Brown

### **Outer Jacket Material**

Material	Material Trade Name	Nominal Diameter	Ripcord	Separator Material
LS PVC - Low Smoke Polyvinyl Chloride	Flamarrest®	0.265 in	Yes	Patented EquiSpline Central Member

#### **Construction and Dimensions**

#### Cabling

Filler Material
Patented EquiSpline Central Member

#### **Electrical Characteristics**

#### **Conductor DCR**

Max. Conductor DCR	Max. DCR Unbalance	Max DCR Unbalanced Between Pairs [%]
8.2 Ohm/100m	3 %	5 %

#### Capacitance

Max. Capacitance Unbalance	Nom.Mutual Capacitance
45 pF/100m	17 pF/ft

# Delay

Max. Delay	Max. Delay Description	Max. Delay Skew	Nominal Velocity of Propagation (VP) [%]
@ 100 MHz 537.6 ns/100m	537 @ 100MHz ns/100m	45 ns/100m	69 %

# High Freq

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. PSNEXT [dB]	Min. PSACR [dB]	Min. PSACRF (PSELFEXT) [dB]	Min. RL (Return Loss) [dB]	Max./Min. Input Impedance (unFitted)	Max./Min. Fitted Impedance	Min. PSANEXT	Min. PSAACRF	Min. TCL [dB]	Min. ELTCTL [dB]
1 MHz	2.1 dB/100m	75.3 dB	73.2 dB	74.8 dB	20.0 dB	100 ± 15 Ohm	105 ± 10 Ohm	75.0 dB	77.0 dB	40.0 dB	35.0 dB
4 MHz	3.8 dB/100m	66.3 dB	62.5 dB	62.8 dB	23.0 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	76.2 dB	40.0 dB	23.0 dB
8 MHz	5.3 dB/100m	61.8 dB	56.5 dB	56.7 dB	24.5 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	70.1 dB	40.0 dB	16.9 dB
10 MHz	5.9 dB/100m	60.3 dB	54.4 dB	54.8 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	68.2 dB	40.0 dB	15.0 dB
16 MHz	7.4 dB/100m	57.2 dB	49.8 dB	50.7 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	64.1 dB	38.0 dB	10.9 dB
20 MHz	8.3 dB/100m	55.8 dB	47.5 dB	48.8 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	62.2 dB	37.0 dB	9.0 dB
25 MHz	9.3 dB/100m	54.3 dB	45.0 dB	46.8 dB	24.3 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	60.2 dB	36.0 dB	7.0 dB
31.25 MHz	10.4 dB/100m	52.9 dB	42.5 dB	44.9 dB	23.6 dB	100 ± 15 Ohm	100 ± 10 Ohm	75.0 dB	58.3 dB	35.1 dB	5.1 dB
62.5 MHz	14.8 dB/100m	48.4 dB	33.6 dB	38.9 dB	21.5 dB	100 ± 15 Ohm	100 ± 10 Ohm	73.6 dB	52.3 dB	32.0 dB	
100 MHz	18.9 dB/100m	45.3 dB	26.4 dB	34.8 dB	20.1 dB	100 ± 15 Ohm	100 ± 10 Ohm	70.5 dB	48.2 dB	30.0 dB	
200 MHz	27.0 dB/100m	40.8 dB	13.8 dB	28.8 dB	18.0 dB	100 ± 22 Ohm	100 ± 10 Ohm	66.0 dB	42.2 dB	27.0 dB	
250 MHz	30.4 dB/100m	39.3 dB	9.0 dB	26.8 dB	17.3 dB	100 ± 32 Ohm	100 ± 10 Ohm	64.5 dB	40.2 dB	26.0 dB	
300 MHz	33.5 dB/100m	38.1 dB	4.6 dB	25.3 dB	16.8 dB	100 ± 32 Ohm	100 ± 10 Ohm	63.3 dB	38.7 dB	25.2 dB	
350 MHz	36.3 dB/100m	37.1 dB	0.8 dB	23.9 dB	16.3 dB	100 ± 32 Ohm	100 ± 10 Ohm	62.3 dB	37.3 dB	24.6 dB	
400 MHz	39.0 dB/100m	36.3 dB		22.8 dB	15.9 dB	100 ± 32 Ohm	100 ± 10 Ohm	61.5 dB	36.2 dB	24.0 dB	
450 MHz	41.5 dB/100m	35.5 dB		21.7 dB	15.5 dB	100 ± 32 Ohm	100 ± 10 Ohm	60.7 dB	35.1 dB	23.5 dB	
500 MHz	43.9 dB/100m	34.8 dB		20.8 dB	15.2 dB	100 ± 32 Ohm	100 ± 10 Ohm	60.0 dB	34.2 dB	23.0 dB	
550 MHz	46.2 dB/100m	33.2 dB		20.0 dB	14.9 dB	100 ± 32 Ohm	100 ± 10 Ohm	59.4 dB	33.4 dB		
600 MHz	48.4 dB/100m	32.6 dB		19.2 dB	14.7 dB	100 ± 32 Ohm	100 ± 10 Ohm	58.8 dB	32.6 dB		
625 MHz	49.5 dB/100m	32.4 dB		18.9 dB	14.5 dB	100 ± 32 Ohm	100 ± 10 Ohm	58.6 dB	32.3 dB		
750 MHz	54.7 dB/100m	32.2 dB		17.3 dB	14.0 dB			57.4 dB	30.7 dB		
860 MHz	58.9 dB/100m	31.3 dB		16.1 dB	13.6 dB			56.5 dB	29.5 dB		

# Voltage

UL Voltage Rating
300V RMS

# **Temperature Range**

Installation Temp Range:	0°C To +50°C
UL Temp Rating:	105°C
Storage Temp Range:	-20°C To +75°C
Operating Temp Range:	-20°C To +75°C

# **Mechanical Characteristics**

Bulk Cable Weight:	37 lbs/1000ft
Max Recommended Pulling Tension:	25 lbs
Min Bend Radius/Minor Axis:	2.25 in
Min Bend Radius/Installation:	2.75 in

# Standards

NEC Articles:	800
NEC/(UL) Specification:	CMP
CEC/C(UL) Specification:	CMP
ISO/IEC Compliance:	11801 ed 2.2 (2011) Class EA
CPR Euroclass:	Eca

Data Category:	Category 6A
ANSI Compliance:	S-116-732-2013 Category 6A, ANSI/NEMA WC-66 Category 6A
Telecommunications Standards:	ANSI/TIA-568-C.2 Category 6A
IEEE Specification:	POE per 802.3af & POE+ per 802.3at-2009
Other Specification:	Verified Channel/Category 6A
Other Standards:	C(UL)US CMP 105C OR (UL) CMP-LP (0.7A) OR CL3P-LP (0.7A)

# **Applicable Environmental and Other Programs**

EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2002/95/EC (RoHS):	Yes
EU Directive 2002/96/EC (WEEE):	Yes
EU Directive 2003/11/EC (BFR):	Yes
EU Directive 2003/96/EC (BFR):	Yes
EU Directive 2011/65/EU (ROHS II):	Yes
EU Directive 2012/19/EU (WEEE):	Yes
EU Directive 2015/863/EU:	Yes
EU Directive Compliance:	Yes
EU CE Mark:	Yes
EU REACH SVHC Compliance (yyyy-mm-dd):	2017-07-10
EU RoHS Compliance Date (yyyy-mm-dd):	2015-03-31
CA Prop 65 (CJ for Wire & Cable):	Yes
MII Order #39 (China RoHS):	Yes

# Suitability

Suitability - Aerial:	No
Suitability - Burial:	No
Suitability - Hazardous Locations:	No
Suitability - Indoor:	Yes
Suitability - Non-Halogenated:	No
Suitability - Oil Resistance:	No
Suitability - Outdoor:	No
Suitability - Sunlight Resistance:	No

# Flammability, LS0H, Toxicity Testing

C(UL) Flammability:	FT6	
UL Flammability:	NFPA 262 Plenum (UL 910)	
CSA Flammability:	FT6	

# **Part Number**

Plenum (Y/N):	Yes
Non-Plenum Number:	10GXS12

# Variants

Item #	Color
10GXS13 D151000	BLUE
10GXS13 0081000	GRAY
10GXS13 0021000	RED

10GXS13 0091000	WHITE
10GXS13009A1000	WHITE

Patent: http://www.belden.com/p

#### **Product Notes**

Notes:	Values above 625 MHz are for Engineering Information Only. Print Includes Descending Footage/Meter Markings from Max. Put-Up Length to 0.
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Part Number: 10GXS12

CAT6A 10GX Small Diameter, 4pr, UTP, PVC Jkt, CMR

#### **Product Description**

CAT6A Enhanced (625MHz), 4-Unbonded-Pair, Riser-CMR 90C OR CMR-LP (0.6A) OR CL3R-LP (0.6A), Premise Horizontal cable, 23 AWG Solid Bare Copper conductors, polyolefin insulation, patented Equispline™ & EquiBlock™ Technologies, ripcord, PVC jacket

#### **Technical Specifications**

#### **Product Overview**

Environmental Space:	Riser
Suitable Applications:	Premise Horizontal Cable, 10 Gigabit Ethernet, Wireless, WIFI, 100BaseTX, 100BaseVG ANYLAN, 155ATM, 622ATM, NTSC/PAL Component or Composite Video, AES/EBU Digital Audio, AES51, RS-422, Noisy Environments, PoE, PoE Plus

## **Physical Characteristics (Overall)**

#### Conductor

AWG	Stranding	Material	No. of Pairs
23	Solid	BC - Bare Copper	4
Condu	ctor Count:		8
Total N	Number of Pa	airs:	4
Condu	ictor Size:		23 AWG

## Insulation

Material
PO - Polyolefin

#### Color Chart

Number	Color
1	White & Blue
2	White & Orange
3	White & Green
4	White & Brown

#### **Outer Jacket Material**

	Material	Nominal Diameter	Ripcord	Separator Material
P۱	VC - Polyvinyl Chloride	0.273 in	Yes	Patented EquiSpline Central Member

#### **Electrical Characteristics**

#### Conductor DCR

Max. Conductor DCR	Max. DCR Unbalance	Max DCR Unbalanced Between Pairs [%]
82 Ohm/km	3 %	5 %

#### Capacitance

Max. Capacitance Unbalance	Nom.Mutual Capacitance
45 pF/100m	17 pF/ft

#### Delay

Frequency [MHz]	Max. Delay	Max. Delay Skew	Nominal Velocity of Propagation (VP) [%]	Typical Delay Skew
100 MHz	537.6 ns/100m	45 ns/100m	65 %	30 ns/100m

#### High Freq

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. PSNEXT [dB]	Min. PSACR [dB]	Min. PSACRF (PSELFEXT) [dB]	Min. RL (Return Loss) [dB]	Max./Min. Input Impedance (unFitted)	Max./Min. Fitted Impedance	Min. PSANEXT	Min. PSAACRF	Min. TCL [dB]	Min. ELTCTL [dB]
1 MHz	2.1 dB/100m	75.3 dB	73.2 dB	74.8 dB	20.0 dB	100 ± 15 Ohm	105 ± 10 Ohm	75.0 dB	77.0 dB	40.0 dB	35.0 dB
4 MHz	3.8 dB/100m	66.3 dB	62.5 dB	62.8 dB	23.0 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	76.2 dB	40.0 dB	23.0 dB
8 MHz	5.3 dB/100m	61.8 dB	56.5 dB	56.7 dB	24.5 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	70.1 dB	40.0 dB	16.9 dB
10 MHz	5.9 dB/100m	60.3 dB	54.4 dB	54.8 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	68.2 dB	40.0 dB	15.0 dB
16 MHz	7.4 dB/100m	57.2 dB	49.8 dB	50.7 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	64.1 dB	38.0 dB	10.9 dB
20 MHz	8.3 dB/100m	55.8 dB	47.5 dB	48.8 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	62.2 dB	37.0 dB	9.0 dB
25 MHz	9.3 dB/100m	54.3 dB	45.0 dB	46.8 dB	24.3 dB	100 ± 15 Ohm	100 ± 15 Ohm	75.0 dB	60.2 dB	36.0 dB	7.0 dB
31.25 MHz	10.4 dB/100m	52.9 dB	42.5 dB	44.9 dB	23.6 dB	100 ± 15 Ohm	100 ± 10 Ohm	75.0 dB	58.3 dB	35.1 dB	5.1 dB
62.5 MHz	14.8 dB/100m	48.4 dB	33.6 dB	38.9 dB	21.5 dB	100 ± 15 Ohm	100 ± 10 Ohm	73.6 dB	52.3 dB	32.0 dB	
100 MHz	18.9 dB/100m	45.3 dB	26.4 dB	34.8 dB	20.1 dB	100 ± 15 Ohm	100 ± 10 Ohm	70.5 dB	48.2 dB	30.0 dB	
200 MHz	27.0 dB/100m	40.8 dB	13.8 dB	28.8 dB	18.0 dB	100 ± 22 Ohm	100 ± 10 Ohm	66.0 dB	42.2 dB	27.0 dB	
250 MHz	30.4 dB/100m	39.3 dB	9.0 dB	26.8 dB	17.3 dB	100 ± 32 Ohm	100 ± 10 Ohm	64.5 dB	40.2 dB	26.0 dB	
300 MHz	33.5 dB/100m	38.1 dB	4.6 dB	25.3 dB	16.8 dB	100 ± 32 Ohm	100 ± 10 Ohm	63.3 dB	38.7 dB	25.2 dB	
350 MHz	36.3 dB/100m	37.1 dB	0.8 dB	23.9 dB	16.3 dB	100 ± 32 Ohm	100 ± 10 Ohm	62.3 dB	37.3 dB	24.6 dB	
400 MHz	39.0 dB/100m	36.3 dB		22.8 dB	15.9 dB	100 ± 32 Ohm	100 ± 10 Ohm	61.5 dB	36.2 dB	24.0 dB	
450 MHz	41.5 dB/100m	35.5 dB		21.7 dB	15.5 dB	100 ± 32 Ohm	100 ± 10 Ohm	60.7 dB	35.1 dB	23.5 dB	
500 MHz	43.9 dB/100m	34.8 dB		20.8 dB	15.2 dB	100 ± 32 Ohm	100 ± 10 Ohm	60.0 dB	34.2 dB	23.0 dB	
550 MHz	46.2 dB/100m	33.2 dB		20.0 dB	14.9 dB	100 ± 32 Ohm	100 ± 10 Ohm	59.4 dB	33.4 dB		
600 MHz	48.4 dB/100m	32.6 dB		19.2 dB	14.7 dB	100 ± 32 Ohm	100 ± 10 Ohm	58.8 dB	32.6 dB		
625 MHz	49.5 dB/100m	32.4 dB		18.9 dB	14.5 dB	100 ± 32 Ohm	100 ± 10 Ohm	58.6 dB	32.3 dB		
750 MHz	54.7 dB/100m	32.2 dB		17.3 dB	14.0 dB			57.4 dB	30.7 dB		
860 MHz	58.9 dB/100m	31.3 dB		16.1 dB	13.6 dB			56.5 dB	29.5 dB		

# Voltage

UL Voltage Rating

# **Temperature Range**

Installation Temp Range:	0°C To +50°C
UL Temp Rating:	90°C
Storage Temp Range:	-20°C To +75°C
Operating Temp Range:	-20°C To +75°C

# **Mechanical Characteristics**

Bulk Cable Weight:	35 lbs/1000ft
Max Recommended Pulling Tension:	25 lbs
Min Bend Radius/Minor Axis:	2.25 in
Min Bend Radius/Installation:	2.75 in

## **Standards**

NEC Articles:	800
NEC/(UL) Specification:	CMR
CEC/C(UL) Specification:	CMR
ISO/IEC Compliance:	11801 ed 2.2 (2011) Class EA
CPR Euroclass:	Eca
Data Category:	Category 6A
ANSI Compliance:	S-116-732-2013 Category 6A, ANSI/NEMA WC-66 Category 6A
Telecommunications Standards:	ANSI/TIA-568-C.2 Category 6A
IEEE Specification:	IEEE 802.3bt Type 1, Type 2, Type 3, Type 4
Other Specification:	Verified Channel/Category 6A
Other Standards:	C(UL)US CMR 90C OR (UL) CMR-LP (0.6A) OR CL3R-LP (0.6A)

# **Applicable Environmental and Other Programs**

EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2002/95/EC (RoHS):	Yes
EU Directive 2002/96/EC (WEEE):	Yes
EU Directive 2003/11/EC (BFR):	Yes

EU Directive 2003/96/EC (BFR):	Yes
EU Directive 2011/65/EU (ROHS II):	Yes
EU Directive 2012/19/EU (WEEE):	Yes
EU Directive 2015/863/EU:	Yes
EU Directive Compliance:	Yes
EU CE Mark:	Yes
EU REACH SVHC Compliance (yyyy-mm-dd):	2017-07-10
EU RoHS Compliance Date (yyyy-mm-dd):	2015-03-31
CA Prop 65 (CJ for Wire & Cable):	Yes
MII Order #39 (China RoHS):	Yes

#### Suitability

Suitability - Aerial:	No
Suitability - Burial:	No
Suitability - Hazardous Locations:	No
Suitability - Indoor:	Yes
Suitability - Non-Halogenated:	No
Suitability - Oil Resistance:	No
Suitability - Outdoor:	No
Suitability - Sunlight Resistance:	No

#### Flammability, LS0H, Toxicity Testing

C(UL) Flammability:	FT4
UL Flammability:	UL 1666 Riser
UL voltage rating:	300 V RMS

#### Plenum/Non-Plenum

Plenum (Y/N):	No
Plenum Number:	10GXS13

#### **Part Number**

#### Variants

Item #	Color
10GXS12 0101000	Black
10GXS12010A1000	Black
10GXS12 0061000	Blue
10GXS12006A1000	Blue
10GXS12 0041000	Yellow
10GXS12004A1000	Yellow

Patent: https://www.belden.com/resources/patents

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Part Number: 2413



CAT6+ Horizontal, 4pr, UTP, LS-PVC Jkt, CMP

# **Product Description**

CAT6+ (350MHz), 4-Pair, U/UTP-unshielded, Plenum-CMP, Premise Horizontal cable, 23 AWG solid bare copper conductors, dual FRPO/FEP insulation, tape separator, ripcord, Flamarrest® jacket

#### **Technical Specifications**

#### **Product Overview**

Environmental Space:	Plenum
Suitable Applications:	Premise Horizontal Cable, Gigabit Ethernet, 100BaseTX, 100BaseVG ANYLAN, 155 ATM, 622 ATM, 250MHz Category 6

#### **Physical Characteristics (Overall)**

# Conductor

AWG	Stranding	Material	No. of Pairs
23	Solid	BC - Bare Copper	4
Condu	uctor Count:		8
Total I	Number of P	airs:	4

# Insulation

Material
FRPO/FEP - Flame Retardant Polyolefin/Fluorinated Ethylene Propylene

#### **Color Chart**

Number	Color
1	White/Blue Stripe & Blue
2	White/Orange Stripe & Orange
3	White/Green Stripe & Green
4	White/Brown Stripe & Brown

# **Outer Jacket Material**

Material	Material Trade Name	Nominal Diameter	Ripcord	Separator Material
LS PVC - Low Smoke Polyvinyl Chloride	Flamarrest®	0.224 in	Yes	Patented Dielectric Tape

#### **Electrical Characteristics**

# **Conductor DCR**

Max. Conductor DCR	Max. DCR Unbalance
7.8 Ohm/100m	3 %

# Capacitance

Max. Capacitance Unbalance	Nom.Mutual Capacitance
330 pF/100m	17 pF/ft

# Delay

Max. Delay	Max. Delay Skew	Nominal Velocity of Propagation (VP) [%]
@ 100 MHz 537.6 ns/100m	35 ns/100m	72 %

# High Freq

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. NEXT [dB]	Min. PSNEXT [dB]	Min. ACR [dB]	Min. PSACR [dB]	Min. ACRF (ELFEXT) [dB]	Min. PSACRF (PSELFEXT) [dB]	Min. RL (Return Loss) [dB]	Max./Min. Input Impedance (unFitted)	Max./Min. Fitted Impedance
1 MHz	2.0 dB/100m	75.3 dB	75.3 dB	73.3 dB	73.3 dB	70.8 dB	67.8 dB	20.0 dB	100 ± 15 Ohm	102 ± 15 Ohm
4 MHz	3.7 dB/100m	66.3 dB	66.3 dB	62.6 dB	62.6 dB	58.8 dB	55.8 dB	23.0 dB	100 ± 15 Ohm	100 ± 15 Ohm
8 MHz	5.2 dB/100m	61.8 dB	61.8 dB	56.6 dB	56.6 dB	52.7 dB	49.7 dB	24.5 dB	100 ± 15 Ohm	100 ± 15 Ohm
10 MHz	5.8 dB/100m	60.3 dB	60.3 dB	54.5 dB	54.5 dB	50.8 dB	47.8 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm
16 MHz	7.4 dB/100m	57.2 dB	57.2 dB	49.9 dB	49.9 dB	46.7 dB	43.7 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm
20 MHz	8.3 dB/100m	55.8 dB	55.8 dB	47.5 dB	47.5 dB	44.8 dB	41.8 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm
25 MHz	9.3 dB/100m	54.3 dB	54.3 dB	45.1 dB	45.1 dB	42.8 dB	39.8 dB	24.3 dB	100 ± 15 Ohm	100 ± 15 Ohm
31.25 MHz	10.4 dB/100m	52.9 dB	52.9 dB	42.5 dB	42.5 dB	40.9 dB	37.9 dB	23.6 dB	100 ± 15 Ohm	100 ± 15 Ohm
62.5 MHz	15.0 dB/100m	48.4 dB	48.4 dB	33.4 dB	33.4 dB	34.9 dB	31.9 dB	21.5 dB	100 ± 15 Ohm	100 ± 15 Ohm
100 MHz	19.3 dB/100m	45.3 dB	45.3 dB	26.0 dB	26.0 dB	30.8 dB	27.8 dB	20.8 dB	100 ± 15 Ohm	100 ± 15 Ohm
155 MHz	24.6 dB/100m	42.4 dB	42.4 dB	17.9 dB	17.9 dB	27.0 dB	24.0 dB	19.5 dB	100 ± 22 Ohm	100 ± 15 Ohm
200 MHz	28.3 dB/100m	40.8 dB	40.8 dB	12.5 dB	12.5 dB	24.8 dB	21.8 dB	18.7 dB	100 ± 22 Ohm	100 ± 15 Ohm
250 MHz	32.1 dB/100m	39.3 dB	39.3 dB	7.2 dB	7.2 dB	22.8 dB	19.8 dB	18.0 dB	100 ± 32 Ohm	100 ± 15 Ohm
300 MHz	35.6 dB/100m	38.1 dB	36.1 dB	2.5 dB	0.5 dB	21.3 dB	18.3 dB	17.5 dB	100 ± 32 Ohm	100 ± 15 Ohm
350 MHz	38.9 dB/100m	37.1 dB	35.1 dB	-1.8 dB	-3.8 dB	19.9 dB	16.9 dB	17.0 dB	100 ± 32 Ohm	100 ± 15 Ohm
400 MHz	42.0 dB/100m	36.3 dB	34.3 dB	-5.7 dB	-7.7 dB	18.8 dB	15.8 dB	16.6 dB	100 ± 32 Ohm	100 ± 15 Ohm
450 MHz	45.0 dB/100m	35.5 dB	33.5 dB	-9.5 dB	-11.5 dB	17.7 dB	14.7 dB	16.2 dB	100 ± 32 Ohm	100 ± 15 Ohm
500 MHz	47.9 dB/100m	34.8 dB	32.8 dB	-13.1 dB	-15.1 dB	16.8 dB	13.8 dB	15.9 dB	100 ± 32 Ohm	100 ± 15 Ohm
550 MHz	50.6 dB/100m	34.2 dB	32.2 dB	-16.4 dB	-18.4 dB	16.0 dB	13.0 dB	15.6 dB	100 ± 32 Ohm	100 ± 15 Ohm

# Voltage

UL Voltage Rating
300V RMS

# **Temperature Range**

Installation Temp Range:	0°C To +50°C
UL Temp Rating:	90°C
Storage Temp Range:	-20°C To +75°C
Operating Temp Range:	-20°C To +75°C

# **Mechanical Characteristics**

Bulk Cable Weight:	26 lbs/1000ft
Max Recommended Pulling Tension:	25 lbs
Min Bend Radius/Minor Axis:	1.0 in
Min Bend Radius/Installation:	2.25 in

# **Standards**

NEC/(UL) Specification:	CMP
CEC/C(UL) Specification:	CMP
ISO/IEC Compliance:	11801 ed 2.2 (2011) Class E
CPR Euroclass:	Eca
Data Category:	Category 6
ANSI Compliance:	S-116-732-2013 Category 6, ANSI/NEMA WC-66 Category 6
Telecommunications Standards:	ANSI/TIA-568-C.2 Category 6
IEEE Specification:	POE per 802.3af & POE+ per 802.3at-2009
Other Standards:	C(UL)US CMP 90C OR (UL) CMP-LP (0.5A) OR CL3P-LP (0.5A)
Third Party Performance Verification:	Category 6

# **Applicable Environmental and Other Programs**

EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2002/96/EC (WEEE):	Yes

EU Directive 2003/11/EC (BFR):	Yes
EU Directive 2003/96/EC (BFR):	Yes
EU Directive 2011/65/EU (ROHS II):	Yes
EU Directive 2012/19/EU (WEEE):	Yes
EU Directive 2015/863/EU:	Yes
EU Directive Compliance:	Yes
EU CE Mark:	Yes
EU CE Mark: EU REACH SVHC Compliance (yyyy-mm-dd):	Yes 2017-07-10
EU REACH SVHC Compliance	
EU REACH SVHC Compliance (yyyy-mm-dd): EU RoHS Compliance Date	2017-07-10

# Suitability

Suitability - Aerial:	No
Suitability - Burial:	No
Suitability - Hazardous Locations:	No
Suitability - Indoor:	Yes
Suitability - Non-Halogenated:	No
Suitability - Oil Resistance:	No
Suitability - Outdoor:	No
Suitability - Sunlight Resistance:	No

# Flammability, LS0H, Toxicity Testing

C(UL) Flammability:	FT6
UL Flammability:	NFPA 262 Plenum (UL 910)
CSA Flammability:	FT6

# **Part Number**

Plenum (Y/N):	Yes
Non-Plenum Number:	2412

# Variants

Item #	Color
2413 0101000	BLACK
2413 0102500	BLACK
2413 010A1000	BLACK
2413 010U1000	BLACK
2413 D151000	BLUE
2413 D152500	BLUE
2413 D15A1000	BLUE
2413 D15U1000	BLUE
2413 0081000	GRAY
2413 008A1000	GRAY
2413 008U1000	GRAY
2413 0051000	GREEN
2413 0052500	GREEN
2413 005A1000	GREEN
2413 005U1000	GREEN
2413 0031000	ORANGE
2413 003A1000	ORANGE
2413 003U1000	ORANGE
2413 0035000	Orange
2413 0035000	Orange
2413 012A1000	Pink

2413 007A1000	PURPLE
2413 002A1000	RED
2413 0091000	WHITE
2413 0092500	WHITE
2413 009A1000	WHITE
2413 009U1000	WHITE
2413 0041000	YELLOW
2413 0042500	YELLOW
2413 004A1000	YELLOW
2413 004U1000	YELLOW

Patent: http://www.belden.com/p

#### **Product Notes**

١	Notes:	Values above 350 MHz are for Engineering Information Only. Print Includes Descending Footage/Meter Markings from Max. Put-Up Length to 0.
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Belden declares this product to be incompliance with EU LVD (Low Voltage Directive 73/23/EEC), as amended by directive 93/68/EEC.





# Part Number: 2412

CAT6+ Horizontal, 4pr, UTP, PVC Jkt, CMR

# **Product Description**

CAT6+ (350MHz), 4-Pair, U/UTP-unshielded, Riser-CMR, Premise Horizontal cable, 23 AWG solid bare copper conductors, polyolefin insulation, tape separator, ripcord, PVC jacket

#### **Technical Specifications**

#### **Product Overview**

Environmental Space:	Riser
Suitable Applications:	Premise Horizontal Cable, Gigabit Ethernet, 100BaseTX, 100BaseVG ANYLAN, 155ATM, 622ATM

# **Physical Characteristics (Overall)**

#### Conductor

AWG	Stranding	Material	No. of	Pairs
23	Solid	BC - Bare Copper	4	
Condu	Conductor Count:			8
Total I	Total Number of Pairs:		4	

#### Insulation



#### **Color Chart**

Number	Color
1	White/Blue Stripe & Blue
2	White/Orange Stripe & Orange
3	White/Green Stripe & Green
4	White/Brown Stripe & Brown

#### **Outer Jacket Material**

Material	Nominal Diameter	Ripcord	Separator Material
PVC - Polyvinyl Chloride	0.216 in	Yes	Patented Dielectric Tape

# **Electrical Characteristics**

#### **Conductor DCR**

Max. Conductor DCR	Max. DCR Unbalance
7.8 Ohm/100m	3 %

#### Capacitance

Max. Capacitance Unbalance	Nom.Mutual Capacitance
330 pF/100m	17 pF/ft

#### Delay

Max. Delay	Max. Delay Skew	Nominal Velocity of Propagation (VP) [%]					
@ 100 MHz 537.6 ns/100m	35 ns/100m	70 %					

# High Freq

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. NEXT [dB]	Min. PSNEXT [dB]	Min. ACR [dB]	Min. PSACR [dB]	Min. ACRF (ELFEXT) [dB]	Min. PSACRF (PSELFEXT) [dB]	Min. RL (Return Loss) [dB]	Max./Min. Input Impedance (unFitted)	Max./Min. Fitted Impedance
1 MHz	2.0 dB/100m	75.3 dB	75.3 dB	73.3 dB	73.3 dB	70.8 dB	67.8 dB	20.0 dB	100 ± 15 Ohm	102 ± 15 Ohm
4 MHz	3.7 dB/100m	66.3 dB	66.3 dB	62.6 dB	62.6 dB	58.8 dB	55.8 dB	23.0 dB	100 ± 15 Ohm	100 ± 15 Ohm
8 MHz	5.2 dB/100m	61.8 dB	61.8 dB	56.6 dB	56.6 dB	52.7 dB	49.7 dB	24.5 dB	100 ± 15 Ohm	100 ± 15 Ohm
10 MHz	5.8 dB/100m	60.3 dB	60.3 dB	54.5 dB	54.5 dB	50.8 dB	47.8 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm
16 MHz	7.4 dB/100m	57.2 dB	57.2 dB	49.9 dB	49.9 dB	46.7 dB	43.7 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm
20 MHz	8.3 dB/100m	55.8 dB	55.8 dB	47.5 dB	47.5 dB	44.8 dB	41.8 dB	25.0 dB	100 ± 15 Ohm	100 ± 15 Ohm
25 MHz	9.3 dB/100m	54.3 dB	54.3 dB	45.1 dB	45.1 dB	42.8 dB	39.8 dB	24.3 dB	100 ± 15 Ohm	100 ± 15 Ohm
31.25 MHz	10.4 dB/100m	52.9 dB	52.9 dB	42.5 dB	42.5 dB	40.9 dB	37.9 dB	23.6 dB	100 ± 15 Ohm	100 ± 15 Ohm
62.5 MHz	15.0 dB/100m	48.4 dB	48.4 dB	33.4 dB	33.4 dB	34.9 dB	31.9 dB	21.5 dB	100 ± 15 Ohm	100 ± 15 Ohm
100 MHz	19.3 dB/100m	45.3 dB	45.3 dB	26.0 dB	26.0 dB	30.8 dB	27.8 dB	20.8 dB	100 ± 15 Ohm	100 ± 15 Ohm
155 MHz	24.6 dB/100m	42.4 dB	42.4 dB	17.9 dB	17.9 dB	27.0 dB	24.0 dB	19.5 dB	100 ± 22 Ohm	100 ± 15 Ohm
200 MHz	28.3 dB/100m	40.8 dB	40.8 dB	12.5 dB	12.5 dB	24.8 dB	21.8 dB	18.7 dB	100 ± 22 Ohm	100 ± 15 Ohm
250 MHz	32.1 dB/100m	39.3 dB	39.3 dB	7.2 dB	7.2 dB	22.8 dB	19.8 dB	18.0 dB	100 ± 32 Ohm	100 ± 15 Ohm
300 MHz	35.6 dB/100m	38.1 dB	36.1 dB	2.5 dB	0.5 dB	21.3 dB	18.3 dB	17.5 dB	100 ± 32 Ohm	100 ± 15 Ohm
350 MHz	38.9 dB/100m	37.1 dB	35.1 dB	-1.8 dB	-3.8 dB	19.9 dB	16.9 dB	17.0 dB	100 ± 32 Ohm	100 ± 15 Ohm
400 MHz	42.0 dB/100m	36.3 dB	34.3 dB	-5.7 dB	-7.7 dB	18.8 dB	15.8 dB	16.6 dB	100 ± 32 Ohm	100 ± 15 Ohm
450 MHz	45.0 dB/100m	35.5 dB	33.5 dB	-9.5 dB	-11.5 dB	17.7 dB	14.7 dB	16.2 dB	100 ± 32 Ohm	100 ± 15 Ohm
500 MHz	47.9 dB/100m	34.8 dB	32.8 dB	-13.1 dB	-15.1 dB	16.8 dB	13.8 dB	15.9 dB	100 ± 32 Ohm	100 ± 15 Ohm
550 MHz	50.6 dB/100m	34.2 dB	32.2 dB	-16.4 dB	-18.4 dB	16.0 dB	13.0 dB	15.6 dB	100 ± 32 Ohm	100 ± 15 Ohm

# Voltage

UL Voltage Rating
300V RMS

# **Temperature Range**

Installation Temp Range:	0°C To +50°C
UL Temp Rating:	75°C
Storage Temp Range:	-20°C To +75°C
Operating Temp Range:	-20°C To +75°C

# **Mechanical Characteristics**

Bulk Cable Weight:	22 lbs/1000ft
Max Recommended Pulling Tension:	25 lbs
Min Bend Radius/Minor Axis:	1.0 in
Min Bend Radius/Installation:	2.25 in

# **Standards**

NEC Articles:	800
NEC/(UL) Specification:	CMR
CEC/C(UL) Specification:	CMR
ISO/IEC Compliance:	11801 ed 2.2 (2011) Class E
CPR Euroclass:	Eca
Data Category:	Category 6
ANSI Compliance:	S-116-732-2013 Category 6, ANSI/NEMA WC-66 Category 6
Telecommunications Standards:	ANSI/TIA-568-C.2 Category 6
IEEE Specification:	POE per 802.3af & POE+ per 802.3at-2009
Third Party Performance Verification:	Category 6

# **Applicable Environmental and Other Programs**

EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2002/95/EC (RoHS):	Yes

EU Directive 2002/96/EC (WEEE):	Yes
EU Directive 2003/11/EC (BFR):	Yes
EU Directive 2003/96/EC (BFR):	Yes
EU Directive 2011/65/EU (ROHS II):	Yes
EU Directive 2012/19/EU (WEEE):	Yes
EU Directive 2015/863/EU:	Yes
EU Directive Compliance:	Yes
EU CE Mark:	Yes
EU REACH SVHC Compliance (yyyy-mm-dd):	2017-07-10
EU RoHS Compliance Date (yyyy-mm-dd):	2004-01-01
CA Prop 65 (CJ for Wire & Cable):	Yes
MII Order #39 (China RoHS):	Yes

# Suitability

Suitability - Aerial:	No
Suitability - Burial:	No
Suitability - Hazardous Locations:	No
Suitability - Indoor:	Yes
Suitability - Non-Halogenated:	No
Suitability - Oil Resistance:	No
Suitability - Outdoor:	No
Suitability - Sunlight Resistance:	No

# Flammability, LS0H, Toxicity Testing

C(UL) Flammability:	FT4
UL Flammability:	UL 1666 Riser

# Part Number

Plenum (Y/N):	No
Plenum Number:	2413

# Variants

Item #	Color
2412 0101000	BLACK
2412 010A1000	BLACK
2412 010U1000	BLACK
2412 0061000	BLUE
2412 0061400	BLUE
2412 0062500	BLUE
2412 0065000	BLUE
2412 006A1000	BLUE
2412 006U1000	BLUE
2412 0081000	GRAY
2412 008A1000	GRAY
2412 008U1000	GRAY
2412 0051000	GREEN
2412 005A1000	GREEN
2412 005U1000	GREEN
2412 003A1000	ORANGE
2412 003U1000	ORANGE
2412 007A1000	PURPLE
2412 007U1000	PURPLE
2412 002A1000	RED
2412 0091000	WHITE

2412 0092500	WHITE
2412 0095000	WHITE
2412 009A1000	WHITE
2412 009U1000	WHITE
2412 0041000	YELLOW
2412 0041000 2412 0042500	YELLOW YELLOW
2112 0011000	

Patent:	http://www.belden.com/p
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#### **Product Notes**

Notes:	Values above 350 MHz are for Engineering Information Only. Print Includes Descending Footage/Meter Markings from Max. Put-Up Length to 0.
Footnote:	CRATE REEL PUT-UP.

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Belden declares this product to be incompliance with EU LVD (Low Voltage Directive 73/23/EEC), as amended by directive 93/68/EEC.





Part Number: DIW25

CAT3 Backbone, 25pr, UTP, PVC Jkt, CMR

# **Product Description**

CAT3 (16MHz), DIW 25-Pair, U/UTP-unshielded, Riser-CMR, Premise Backbone Cable, 24 AWG solid bare copper conductors, PVC insulation, ripcord, PVC jacket

# **Technical Specifications**

#### **Product Overview**

Environmental Space:	Riser
Suitable Applications:	Premise Backbone Cable

# **Physical Characteristics (Overall)**

#### Conductor

AWG	Stranding	Material	No. of Pairs
24	Solid	BC - Bare Copper	25
Condu	ictor Count:		
Total I	tal Number of Pairs:		

## Insulation

Material PVC - Polyvinyl Chloride	
Bonded-Pair:	N/A

#### Color Chart

Number	Color
1	White/Blue & Blue/White
2	White/Orange & Orange/White
3	White/Green & Green/White
4	White/Brown & Brown/White
5	White/Slate & Slate/White
6	Red/Blue & Blue/Red
7	Red/Orange & Orange/Red
8	Red/Green & Green/Red
9	Red/Brown & Brown/Red
10	Red/Slate & Slate/Red
11	Black/Blue & Blue/Black
12	Black/Orange & Orange/Black
13	Black/Green & Green/Black
14	Black/Brown & Brown/Black
15	Black/Slate & Slate/Black
16	Yellow/Blue & Blue/Yellow
17	Yellow/Orange & Orange/Yellow
18	Yellow/Green & Green/Yellow
19	Yellow/Brown & Brown/Yellow
20	Yellow/Slate & Slate/Yellow
21	Violet/Blue & Blue/Violet

22	Violet/Orange & Orange/Violet
23	Violet/Green & Green/Violet
24	Violet/Brown & Brown/Violet
25	Violet/Slate & Slate/Violet

# Outer Jacket Material

Material	Nominal Diameter	Ripcord
PVC - Polyvinyl Chloride	0.380 in	Yes

#### **Electrical Characteristics**

#### Conductor DCR

Max. Conductor DCR	Max. DCR Unbalance
93.8 Ohm/km	5 %

# Capacitance

Max. Capacitance Unbalance	Nom.Mutual Capacitance
330 pF/100m	17 pF/ft

# Delay

Frequency [MHz]	Max. Delay	Max. Delay Skew	Nominal Velocity of Propagation (VP) [%]
16 MHz	543 ns/100m	45 ns/100m	68 %

# High Freq

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. NEXT [dB]	Min. PSNEXT [dB]	Min. ACR [dB]	Min. PSACR [dB]	Min. RL (Return Loss) [dB]	Max./Min. Fitted Impedance
0.772 MHz	2.2 dB/100m	47.0 dB	43.0 dB	50.1 dB	46.1 dB		
1 MHz	2.6 dB/100m	45.0 dB	41.0 dB	47.8 dB	43.8 dB	12.0 dB	100 ± 15 Ohm
4 MHz	5.6 dB/100m	36.0 dB	32.0 dB	36.0 dB	32.0 dB	12.0 dB	100 ± 15 Ohm
8 MHz	8.5 dB/100m	31.0 dB	28.0 dB	28.3 dB	24.3 dB	12.0 dB	100 ± 15 Ohm
10 MHz	9.7 dB/100m	30.0 dB	26.0 dB	26.2 dB	22.3 dB	12.0 dB	100 ± 15 Ohm
16 MHz	13.1 dB/100m	27.0 dB	23.0 dB	20.1 dB	16.1 dB	10.0 dB	100 ± 15 Ohm

#### Voltage

UL Voltage Rating 300 V RMS

# **Temperature Range**

Installation Temp Range:	-30°C To +60°C
UL Temp Rating:	60°C
Storage Temp Range:	-30°C To +60°C
Operating Temp Range:	-30°C To +60°C

# **Mechanical Characteristics**

Bulk Cable Weight:	100 lbs/1000ft
Max Recommended Pulling Tension:	150 lbs
Min Bend Radius During Installation:	7.75 in
Min Bend Radius/Minor Axis:	4.0 in

# **Standards**

NEC/(UL) Specification:	CMR
CEC/C(UL) Specification:	CMR
Data Category:	Category 3
ANSI Compliance:	S-90-661-2012 Category 3, ANSI/NEMA WC-63.1 Category 3
Telecommunications Standards:	ANSI/TIA-568-C.2 Category 3

# **Applicable Environmental and Other Programs**

EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2003/11/EC (BFR):	Yes
EU Directive 2003/96/EC (BFR):	Yes
EU Directive 2011/65/EU (ROHS II):	Yes
EU Directive 2012/19/EU (WEEE):	Yes

EU Directive 2015/863/EU:	Yes
EU Directive Compliance:	Yes
EU CE Mark:	Yes
EU REACH SVHC Compliance (yyyy-mm-dd):	2017-07-10
EU RoHS Compliance Date (yyyy-mm-dd):	2005-08-19
CA Prop 65 (CJ for Wire & Cable):	Yes
MII Order #39 (China RoHS):	Yes

#### Suitability

Suitability - Aerial:	No
Suitability - Burial:	No
Suitability - Hazardous Locations:	No
Suitability - Indoor:	Yes
Suitability - Non-Halogenated:	No
Suitability - Oil Resistance:	No
Suitability - Outdoor:	No
Suitability - Sunlight Resistance:	No

#### Flammability, LS0H, Toxicity Testing

C(UL) Flammability:	FT4
UL Flammability:	UL 1666 Riser
UL voltage rating:	300 V RMS

#### Plenum/Non-Plenum

Plenum (Y/N):	No	
Plenum Number:	DPLN25	

#### **Part Number**

#### Variants

Item #	Color	UPC	Length
DIW25 7321000	Olive	612825060635	1,000 ft
DIW25 7321000	Olive	612825060635	1,000 ft
DIW25 732500	Olive	612825060628	500 ft
DIW25 732500	Olive	612825060628	500 ft
DIW25 7325000	Olive	612825060642	5,000 ft
DIW25 7325000	Olive	612825060642	5,000 ft
DIW25 732500B	Olive	612825285533	1,500 ft
DIW25 732CUT	Olive	612825060611	
DIW25 732CUT	Olive	612825060611	1 ft

Patent: https://www.belden.com/resources/patents

# **Product Notes**

Notes: Print Includes Descending Footage/Meter Markings.

## **History**

Update and Revision: Revision Number: 0.311 Revision Date: 08-22-2019

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Product: DPLN25 ☑

CAT3 Backbone, 25pr, UTP, LS-PVC Jkt, CMP

# **Product Description**

CAT3 (16MHz), DIW 25-Pair, U/UTP-unshielded, Plenum-CMP, Premise Backbone Cable, 24 AWG solid bare copper conductors, LS-PVC insulation, ripcord, LS-PVC jackeť

# **Technical Specifications**

#### **Product Overview**

Suitab	Suitable Applications:		Premise Backbone Cable			
Phys	Physical Characteristics (Overall)					
Condu	ctor					
AWG Stranding Material No. of Pairs						
24	Solid	BC - Bare Copper	25			
Conductor Count:			50			
Total I	Total Number of Pairs:			25		
Insulat	Insulation					

#### Color Chart

Number	Color
1	White/Blue & Blue/White
2	White/Orange & Orange/White
3	White/Green & Green/White
4	White/Brown & Brown/White
5	White/Slate & Slate/White
6	Red/Blue & Blue/Red
7	Red/Orange & Orange/Red
8	Red/Green & Green/Red
9	Red/Brown & Brown/Red
10	Red/Slate & Slate/Red
11	Black/Blue & Blue/Black
12	Black/Orange & Orange/Black
13	Black/Green & Green/Black
14	Black/Brown & Brown/Black
15	Black/Slate & Slate/Black
16	Yellow/Blue & Blue/Yellow
17	Yellow/Orange & Orange/Yellow
18	Yellow/Green & Green/Yellow
19	Yellow/Brown & Brown/Yellow
20	Yellow/Slate & Slate/Yellow
21	Violet/Blue & Blue/Violet
22	Violet/Orange & Orange/Violet

23	Violet/Green & Green/Violet
24	Violet/Brown & Brown/Violet
25	Violet/Slate & Slate/Violet

# Outer Jacket Material

Material	Material Trade Name	Nominal Diameter	Ripcord
LS PVC - Low Smoke Polyvinyl Chloride	Flamarrest®	0.380 in	Yes

# **Electrical Characteristics**

# Conductor DCR

Max. Conductor DCR	Max. DCR Unbalance
93.8 Ohm/km	5 %

#### Capacitance

Max. Capacitance Unbalance	Nom.Mutual Capacitance
330 pF/100m	17 pF/ft

#### Delay

Frequency [MHz]	Max. Delay	Max. Delay Skew	Nominal Velocity of Propagation (VP) [%]
16 MHz	543 ns/100m	45 ns/100m	61 %

# High Freq

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. NEXT [dB]	Min. PSNEXT [dB]	Min. ACR [dB]	Min. PSACR [dB]	Min. RL (Return Loss) [dB]	Max./Min. Fitted Impedance
0.772 MHz	2.2 dB/100m	47.0 dB	43.0 dB	50.1 dB	46.1 dB		
1 MHz	2.6 dB/100m	45.0 dB	41.0 dB	47.8 dB	43.8 dB	12.0 dB	100 ± 15 Ohm
4 MHz	5.6 dB/100m	36.0 dB	32.0 dB	36.0 dB	32.0 dB	12.0 dB	100 ± 15 Ohm
8 MHz	8.5 dB/100m	31.0 dB	28.0 dB	28.3 dB	24.3 dB	12.0 dB	100 ± 15 Ohm
10 MHz	9.7 dB/100m	30.0 dB	26.0 dB	26.2 dB	22.3 dB	12.0 dB	100 ± 15 Ohm
16 MHz	13.1 dB/100m	27.0 dB	23.0 dB	20.1 dB	16.1 dB	10.0 dB	100 ± 15 Ohm

#### Voltage

UL Voltage Rating 300 V RMS

# **Temperature Range**

Installation Temp Range:	0°C To +50°C
UL Temp Rating:	60°C
Storage Temp Range:	-30°C To +60°C
Operating Temp Range:	-30°C To +60°C

# **Mechanical Characteristics**

Bulk Cable Weight:	103 lbs/1000ft
Max Recommended Pulling Tension:	150 lbs
Min Bend Radius During Installation:	7.75 in
Min Bend Radius/Minor Axis:	4.0 in

# **Standards**

NEC/(UL) Specification:	CMP
CEC/C(UL) Specification:	CMP
CPR Euroclass:	Eca
Data Category:	Category 3
ANSI Compliance:	S-90-661-2012 Category 3, ANSI/NEMA WC-63.1 Category 3
Telecommunications Standards:	ANSI/TIA-568-C.2 Category 3

# **Applicable Environmental and Other Programs**

Environmental Space:	Plenum
EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2003/11/EC (BFR):	Yes
EU Directive 2003/96/EC (BFR):	Yes
EU Directive 2011/65/EU (ROHS II):	Yes

EU Directive 2012/19/EU (WEEE):	Yes
EU Directive 2015/863/EU:	Yes
EU Directive Compliance:	Yes
EU CE Mark:	Yes
EU REACH SVHC Compliance (yyyy-mm-dd):	2017-07-10
EU RoHS Compliance Date (yyyy-mm-dd):	2005-08-19
MII Order #39 (China RoHS):	Yes

#### Suitability

Suitability - Aerial:	No
Suitability - Burial:	No
Suitability - Hazardous Locations:	No
Suitability - Indoor:	Yes
Suitability - Non-Halogenated:	No
Suitability - Oil Resistance:	No
Suitability - Outdoor:	No
Suitability - Sunlight Resistance:	No

#### Flammability, LS0H, Toxicity Testing

C(UL) Flammability:	FT6
UL Flammability:	NFPA 262 Plenum (UL 910)
CSA Flammability:	FT6
ISO/IEC Flammability:	IEC 60332-1-2
UL voltage rating:	300 V RMS

#### Plenum/Non-Plenum

Plenum (Y/N):	Yes	

#### **Part Number**

Non-Plenum Number:	DIW25	
Non-Plenum Number:	DIW25	

#### Variants

Item #	Color	UPC	Length
DPLN25 732S1007	Gray		
DPLN25 7321000	Olive	612825060994	1,000 ft
DPLN25 7321000	Olive	612825060994	1,000 ft
DPLN25 732CUT	Olive	612825060987	
DPLN25 732CUT	Olive	612825060987	1 ft

	https://www.belden.com/resources/patents
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# **Product Notes**

Notes:	Print Includes Descending Footage/Meter Markings.

#### History

Update and Revision:	Revision Number: 0.311 Revision Date: 01-31-2020	

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Part Number: DIW50

CAT3 Backbone, 50pr, UTP, PVC Jkt, CMR

# **Product Description**

CAT3 (16MHz), DIW 50-Pair, U/UTP-unshielded, Riser-CMR, Premise Backbone Cable, 24 AWG solid bare copper conductors, PVC insulation, ripcord, PVC jacket

# **Technical Specifications**

#### **Product Overview**

Environmental Space:	Riser
Suitable Applications:	Premise Backbone Cable

# **Physical Characteristics (Overall)**

#### Conductor

AWG	Stranding	Material	No. of Pairs
24	Solid	BC - Bare Copper	50
Conductor Count:			
Total Number of Pairs:		ire.	

#### Insulation

Material PVC Polywinyl Chlo	ido	
PVC - Polyvinyl Chloride		
Bonded-Pair:		N/A

#### Color Chart

Number	Color
1	White/Blue & Blue/White
2	White/Orange & Orange/White
3	White/Green & Green/White
4	White/Brown & Brown/White
5	White/Slate & Slate/White
6	Red/Blue & Blue/Red
7	Red/Orange & Orange/Red
8	Red/Green & Green/Red
9	Red/Brown & Brown/Red
10	Red/Slate & Slate/Red
11	Black/Blue & Blue/Black
12	Black/Orange & Orange/Black
13	Black/Green & Green/Black
14	Black/Brown & Brown/Black
15	Black/Slate & Slate/Black
16	Yellow/Blue & Blue/Yellow
17	Yellow/Orange & Orange/Yellow
18	Yellow/Green & Green/Yellow
19	Yellow/Brown & Brown/Yellow
20	Yellow/Slate & Slate/Yellow
21	Violet/Blue & Blue/Violet

22	Violet/Orange & Orange/Violet
23	Violet/Green & Green/Violet
24	Violet/Brown & Brown/Violet
25	Violet/Slate & Slate/Violet
Group One Binder	White/Blue
Group Two Binder	White/Orange

# Color Chart 2

Number	Color
1	Blue/White
2	Orange/White

#### Outer Jacket Material

	Material	Nominal Diameter	Ripcord	
PVC - Polyvinyl Chloride		0.540 in	Yes	

# **Electrical Characteristics**

#### Conductor DCR

Max. Conductor DCR	Max. DCR Unbalance	
93.8 Ohm/km	5 %	

#### Capacitance

Max. Capacitance Unbalance	Nom.Mutual Capacitance
330 pF/100m	17 pF/ft

#### Delay

Frequency [MHz]	Max. Delay	Max. Delay Skew	Nominal Velocity of Propagation (VP) [%]
16 MHz	543 ns/100m	45 ns/100m	68 %

# High Freq

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. NEXT [dB]	Min. PSNEXT [dB]	Min. ACR [dB]	Min. PSACR [dB]	Min. RL (Return Loss) [dB]	Max./Min. Fitted Impedance
0.772 MHz	2.2 dB/100m	47.0 dB	43.0 dB	50.1 dB	46.1 dB		
1 MHz	2.6 dB/100m	45.0 dB	41.0 dB	47.8 dB	43.8 dB	12.0 dB	100 ± 15 Ohm
4 MHz	5.6 dB/100m	36.0 dB	32.0 dB	36.0 dB	32.0 dB	12.0 dB	100 ± 15 Ohm
8 MHz	8.5 dB/100m	31.0 dB	28.0 dB	28.3 dB	24.3 dB	12.0 dB	100 ± 15 Ohm
10 MHz	9.7 dB/100m	30.0 dB	26.0 dB	26.2 dB	22.3 dB	12.0 dB	100 ± 15 Ohm
16 MHz	13.1 dB/100m	27.0 dB	23.0 dB	20.1 dB	16.1 dB	10.0 dB	100 ± 15 Ohm

# Voltage

UL Voltage Rating 300 V RMS

# **Temperature Range**

Installation Temp Range:	-30°C To +60°C
UL Temp Rating:	60°C
Storage Temp Range:	-30°C To +60°C
Operating Temp Range:	-30°C To +60°C

# **Mechanical Characteristics**

Bulk Cable Weight:	179 lbs/1000ft
Max Recommended Pulling Tension:	300 lbs
Min Bend Radius During Installation:	11.0 in
Min Bend Radius/Minor Axis:	5.5 in

# **Standards**

NEC/(UL) Specification:	CMR
CEC/C(UL) Specification:	CMR
Data Category:	Category 3
ANSI Compliance:	S-90-661-2012 Category 3, ANSI/NEMA WC-63.1 Category 3
Telecommunications Standards:	ANSI/TIA-568-C.2 Category 3

#### **Applicable Environmental and Other Programs**

EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2003/11/EC (BFR):	Yes
EU Directive 2003/96/EC (BFR):	Yes
EU Directive 2011/65/EU (ROHS II):	Yes
EU Directive 2012/19/EU (WEEE):	Yes
EU Directive 2015/863/EU:	Yes
EU Directive Compliance:	Yes
EU CE Mark:	Yes
EU REACH SVHC Compliance (yyyy-mm-dd):	2017-07-10
EU RoHS Compliance Date (yyyy-mm-dd):	2005-08-19
CA Prop 65 (CJ for Wire & Cable):	Yes
MII Order #39 (China RoHS):	Yes

#### Suitability

Suitability - Aerial:	No
Suitability - Burial:	No
Suitability - Hazardous Locations:	No
Suitability - Indoor:	Yes
Suitability - Non-Halogenated:	No
Suitability - Oil Resistance:	No
Suitability - Outdoor:	No
Suitability - Sunlight Resistance:	No

#### Flammability, LS0H, Toxicity Testing

C(UL) Flammability:	FT4
UL Flammability:	UL 1666 Riser
UL voltage rating:	300 V RMS

# Plenum/Non-Plenum

Plenum (Y/N):	No
Plenum Number:	DPLN50

#### **Part Number**

#### Variants

Item #	Color	UPC	Length
DIW50 7321000	Olive	612825060666	1,000 ft
DIW50 7321000	Olive	612825060666	1,000 ft
DIW50 7322500	Olive	612825060673	2,500 ft
DIW50 7322500	Olive	612825060673	2,500 ft
DIW50 732CUT	Olive	612825060659	
DIW50 732CUT	Olive	612825060659	1 ft

Patent: https://www.belden.com/resources/patents

# **Product Notes**

Notes:	Print Includes Descending Footage/Meter Markings.

# History

Update and Revision:	Revision Number: 0.315 Revision Date: 08-22-2019
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Product: DPLN50 ☑

CAT3 Backbone, 50pr, UTP, LS-PVC Jkt, CMP

# **Product Description**

CAT3 (16MHz), DIW 50-Pair, U/UTP-unshielded, Plenum-CMP, Premise Backbone Cable, 24 AWG solid bare copper conductors, LS-PVC insulation, ripcord, LS-PVC jackeť

# **Technical Specifications**

#### **Product Overview**

nysical Characteristics (Overall)
nductor
WG Stranding Material No. of Pairs
4 Solid BC - Bare Copper 50
onductor Count:
otal Number of Pairs:

Material		
LS PVC - Low Smoke Polyvinyl Chloride		
Bonded-Pair:	N/A	

#### Color Chart

Number	Color
1	White/Blue & Blue/White
2	White/Orange & Orange/White
3	White/Green & Green/White
4	White/Brown & Brown/White
5	White/Slate & Slate/White
6	Red/Blue & Blue/Red
7	Red/Orange & Orange/Red
8	Red/Green & Green/Red
9	Red/Brown & Brown/Red
10	Red/Slate & Slate/Red
11	Black/Blue & Blue/Black
12	Black/Orange & Orange/Black
13	Black/Green & Green/Black
14	Black/Brown & Brown/Black
15	Black/Slate & Slate/Black
16	Yellow/Blue & Blue/Yellow
17	Yellow/Orange & Orange/Yellow
18	Yellow/Green & Green/Yellow
19	Yellow/Brown & Brown/Yellow
20	Yellow/Slate & Slate/Yellow
21	Violet/Blue & Blue/Violet
22	Violet/Orange & Orange/Violet

23	Violet/Green & Green/Violet
24	Violet/Brown & Brown/Violet
25	Violet/Slate & Slate/Violet
Group One Binder	White/Blue
Group Two Binder	White/Orange

#### Color Chart 2

Number	Color
1	Blue/White
2	Orange/White

#### Outer Jacket Material

Material	Material Trade Name	Nominal Diameter	Ripcord
LS PVC - Low Smoke Polyvinyl Chloride	Flamarrest®	0.540 in	Yes

# **Electrical Characteristics**

# Conductor DCR

Max. Conductor DCR	Max. DCR Unbalance
93.8 Ohm/km	5 %

# Capacitance

Max. Capacitance Unbalance	Nom.Mutual Capacitance
330 pF/100m	17 pF/ft

# Delay

Frequency [MHz]	Max. Delay	Max. Delay Skew	Nominal Velocity of Propagation (VP) [%]
16 MHz	543 ns/100m	45 ns/100m	61 %

# High Freq

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. NEXT [dB]	Min. PSNEXT [dB]	Min. ACR [dB]	Min. PSACR [dB]	Min. RL (Return Loss) [dB]	Max./Min. Fitted Impedance
0.772 MHz	2.2 dB/100m	47.0 dB	43.0 dB	50.1 dB	46.1 dB		
1 MHz	2.6 dB/100m	45.0 dB	41.0 dB	47.8 dB	43.8 dB	12.0 dB	100 ± 15 Ohm
4 MHz	5.6 dB/100m	36.0 dB	32.0 dB	36.0 dB	32.0 dB	12.0 dB	100 ± 15 Ohm
8 MHz	8.5 dB/100m	31.0 dB	28.0 dB	28.3 dB	24.3 dB	12.0 dB	100 ± 15 Ohm
10 MHz	9.7 dB/100m	30.0 dB	26.0 dB	26.2 dB	22.3 dB	12.0 dB	100 ± 15 Ohm
16 MHz	13.1 dB/100m	27.0 dB	23.0 dB	20.1 dB	16.1 dB	10.0 dB	100 ± 15 Ohm

# Voltage

UL Voltage Rating
300 V RMS

# **Temperature Range**

Installation Temp Range:	0°C To +50°C
UL Temp Rating:	60°C
Storage Temp Range:	-30°C To +60°C
Operating Temp Range:	-30°C To +60°C

# **Mechanical Characteristics**

Bulk Cable Weight:	205 lbs/1000ft
Max Recommended Pulling Tension:	300 lbs
Min Bend Radius During Installation:	11.0 in
Min Bend Radius/Minor Axis:	5.5 in

# Standards

NEC/(UL) Specification:	CMP
CEC/C(UL) Specification:	CMP
CPR Euroclass:	Eca
Data Category:	Category 3
ANSI Compliance:	S-90-661-2012 Category 3, ANSI/NEMA WC-63.1 Category 3
Telecommunications Standards:	ANSI/TIA-568-C.2 Category 3

#### **Applicable Environmental and Other Programs**

Environmental Space:	Plenum
EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2003/11/EC (BFR):	Yes
EU Directive 2003/96/EC (BFR):	Yes
EU Directive 2011/65/EU (ROHS II):	Yes
EU Directive 2012/19/EU (WEEE):	Yes
EU Directive 2015/863/EU:	Yes
EU Directive Compliance:	Yes
EU CE Mark:	Yes
EU REACH SVHC Compliance (yyyy-mm-dd):	2017-07-10
EU RoHS Compliance Date (yyyy-mm-dd):	2005-08-19
MII Order #39 (China RoHS):	Yes

#### Suitability

Suitability - Aerial:	No
Suitability - Burial:	No
Suitability - Hazardous Locations:	No
Suitability - Indoor:	Yes
Suitability - Non-Halogenated:	No
Suitability - Oil Resistance:	No
Suitability - Outdoor:	No
Suitability - Sunlight Resistance:	No

#### Flammability, LS0H, Toxicity Testing

C(UL) Flammability:	FT6
UL Flammability:	NFPA 262 Plenum (UL 910)
CSA Flammability:	FT6
ISO/IEC Flammability:	IEC 60332-1-2
UL voltage rating:	300 V RMS

## Plenum/Non-Plenum

Plenum (Y/N):	Yes

#### **Part Number**

Non-Plenur	n Number:	DIW50
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#### Variants

Item #	Color	UPC	Length
DPLN50 732S1007	Gray		
DPLN50 732CUT	Olive	612825061007	
DPLN50 732CUT	Olive	612825061007	1 ft

#### **Product Notes**

Notes:	Print Includes Descending Footage/Meter Markings.
	0 0

# History

Update and Revision:	Revision Number: 0.311 Revision Date: 01-31-2020	

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CAT3 Backbone, 100pr, UTP, PVC Jkt, CMR

# **Product Description**

CAT3 (16MHz), DIW 100-Pair, U/UTP-unshielded, Riser-CMR, Premise Backbone Cable, 24 AWG solid bare copper conductors, PVC insulation, ripcord, PVC jacket

# **Technical Specifications**

#### **Product Overview**

Suitable Applications:	Premise Backbone Cable		
Physical Characteristics (Overall)			
Conductor	Conductor		
AWG Stranding Material No. of Pairs			
24 Solid BC - Bare Copper 100			
Conductor Count:	200		
Total Number of Pairs:	100		
Insulation			

M	terial error	
PVC - Pol	vinyl Chloride	
Bonded-P	uir:	N/A

#### Color Chart

Number	Color
1	White/Blue & Blue/White
2	White/Orange & Orange/White
3	White/Green & Green/White
4	White/Brown & Brown/White
5	White/Slate & Slate/White
6	Red/Blue & Blue/Red
7	Red/Orange & Orange/Red
8	Red/Green & Green/Red
9	Red/Brown & Brown/Red
10	Red/Slate & Slate/Red
11	Black/Blue & Blue/Black
12	Black/Orange & Orange/Black
13	Black/Green & Green/Black
14	Black/Brown & Brown/Black
15	Black/Slate & Slate/Black
16	Yellow/Blue & Blue/Yellow
17	Yellow/Orange & Orange/Yellow
18	Yellow/Green & Green/Yellow
19	Yellow/Brown & Brown/Yellow
20	Yellow/Slate & Slate/Yellow
21	Violet/Blue & Blue/Violet
22	Violet/Orange & Orange/Violet

23	Violet/Green & Green/Violet
24	Violet/Brown & Brown/Violet
25	Violet/Slate & Slate/Violet
Group One Binder	White/Blue
Group Two Binder	White/Orange
Group Three Binder	White/Green
Group Four Binder	White/Brown

#### Color Chart 2

Number	Color
1	Blue/White
2	Orange/White
3	Green/White
4	Brown/White

#### Outer Jacket Material

Material	Nominal Diameter	Ripcord
PVC - Polyvinyl Chloride	0.760 in	Yes

# **Electrical Characteristics**

# Conductor DCR

Max. Conductor DCR	Max. DCR Unbalance
93.8 Ohm/km	5 %

# Capacitance

Max. Capacitance Unbalance	Nom.Mutual Capacitance
330 pF/100m	17 pF/ft

#### Delay

Frequency [MHz]	Max. Delay	Max. Delay Skew	Nominal Velocity of Propagation (VP) [%]
16 MHz	543 ns/100m	45 ns/100m	68 %

# High Freq

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. NEXT [dB]	Min. PSNEXT [dB]	Min. ACR [dB]	Min. PSACR [dB]	Min. RL (Return Loss) [dB]	Max./Min. Fitted Impedance
0.772 MHz	2.2 dB/100m	47.0 dB	43.0 dB	50.1 dB	46.1 dB		
1 MHz	2.6 dB/100m	45.0 dB	41.0 dB	47.8 dB	43.8 dB	12.0 dB	100 ± 15 Ohm
4 MHz	5.6 dB/100m	36.0 dB	32.0 dB	36.0 dB	32.0 dB	12.0 dB	100 ± 15 Ohm
8 MHz	8.5 dB/100m	31.0 dB	28.0 dB	28.3 dB	24.3 dB	12.0 dB	100 ± 15 Ohm
10 MHz	9.7 dB/100m	30.0 dB	26.0 dB	26.2 dB	22.3 dB	12.0 dB	100 ± 15 Ohm
16 MHz	13.1 dB/100m	27.0 dB	23.0 dB	20.1 dB	16.1 dB	10.0 dB	100 ± 15 Ohm

#### Voltage

UL Voltage Rating 300 V RMS

# **Temperature Range**

Installation Temp Range:	-30°C To +60°C
UL Temp Rating:	60°C
Storage Temp Range:	-30°C To +60°C
Operating Temp Range:	-30°C To +60°C

#### **Mechanical Characteristics**

Bulk Cable Weight:	349 lbs/1000ft
Max Recommended Pulling Tension:	600 lbs
Min Bend Radius During Installation:	15.25 in
Min Bend Radius/Minor Axis:	7.75 in

# **Standards**

NEC/(UL) Specification:	CMR
CEC/C(UL) Specification:	CMR

Data Category:	Category 3
ANSI Compliance:	S-90-661-2012 Category 3, ANSI/NEMA WC-63.1 Category 3
Telecommunications Standards:	ANSI/TIA-568-C.2 Category 3

#### **Applicable Environmental and Other Programs**

Environmental Space:	Riser
EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2003/11/EC (BFR):	Yes
EU Directive 2003/96/EC (BFR):	Yes
EU Directive 2011/65/EU (ROHS II):	Yes
EU Directive 2012/19/EU (WEEE):	Yes
EU Directive 2015/863/EU:	Yes
EU Directive Compliance:	Yes
EU CE Mark:	Yes
EU REACH SVHC Compliance (yyyy-mm-dd):	2017-07-10
EU RoHS Compliance Date (yyyy-mm-dd):	2005-08-19
MII Order #39 (China RoHS):	Yes

#### Suitability

Suitability - Aerial:	No
Suitability - Burial:	No
Suitability - Hazardous Locations:	No
Suitability - Indoor:	Yes
Suitability - Non-Halogenated:	No
Suitability - Oil Resistance:	No
Suitability - Outdoor:	No
Suitability - Sunlight Resistance:	No

#### Flammability, LS0H, Toxicity Testing

C(UL) Flammability:	FT4
UL Flammability:	UL 1666 Riser
UL voltage rating:	300 V RMS

#### Plenum/Non-Plenum

Plenum (Y/N):	No
Plenum Number:	DPLN100

#### **Part Number**

#### Variants

Item #	Color	UPC	Length
DIW100 7321575	Olive	612825060697	1 ft
DIW100 7321575	Olive	612825060697	1 ft
DIW100 732CUT	Olive	612825060680	
DIW100 732CUT	Olive	612825060680	1 ft

Patent: https://www.belden.com/resources/patents

#### **Product Notes**

Notes:	Print Includes Descending Footage/Meter Markings.

# History

Update and Revision:	Revision Number: 0.316 Revision Date: 01-31-2020

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CAT3 Backbone, 100pr, UTP, LS-PVC Jkt, CMP

# **Product Description**

CAT3 (16MHz), DIW 100-Pair, U/UTP-unshielded, Plenum-CMP, Premise Backbone Cable, 24 AWG solid bare copper conductors, LS-PVC insulation, ripcord, LS-PVC jacket

# **Technical Specifications**

#### **Product Overview**

Suita	ble Applicatio	ns:	
Phys	Physical Characteristics (Overall)		
Cond	ıctor		
AWG	Stranding	Material	No. of Pairs
24	Solid	BC - Bare Copper	100
Conductor Count:			
Total	Total Number of Pairs:		

#### Insulation

#### Color Chart

Number	Color
1	White/Blue & Blue/White
2	White/Orange & Orange/White
3	White/Green & Green/White
4	White/Brown & Brown/White
5	White/Slate & Slate/White
6	Red/Blue & Blue/Red
7	Red/Orange & Orange/Red
8	Red/Green & Green/Red
9	Red/Brown & Brown/Red
10	Red/Slate & Slate/Red
11	Black/Blue & Blue/Black
12	Black/Orange & Orange/Black
13	Black/Green & Green/Black
14	Black/Brown & Brown/Black
15	Black/Slate & Slate/Black
16	Yellow/Blue & Blue/Yellow
17	Yellow/Orange & Orange/Yellow
18	Yellow/Green & Green/Yellow
19	Yellow/Brown & Brown/Yellow
20	Yellow/Slate & Slate/Yellow
21	Violet/Blue & Blue/Violet
22	Violet/Orange & Orange/Violet

23	Violet/Green & Green/Violet
24	Violet/Brown & Brown/Violet
25	Violet/Slate & Slate/Violet
Group One Binder	White/Blue
Group Two Binder	White/Orange
Group Three Binder	White/Green
Group Four Binder	White/Brown

#### Color Chart 2

Number	Color
1	Blue/White
2	Orange/White
3	Green/White
4	Brown/White

#### Outer Jacket Material

Material	Material Trade Name	Nominal Diameter	Ripcord
LS PVC - Low Smoke Polyvinyl Chloride	Flamarrest®	0.775 in	Yes

# **Electrical Characteristics**

# Conductor DCR

Max. Conductor DCR	Max. DCR Unbalance
93.8 Ohm/km	5 %

# Capacitance

Max. Capacitance Unbalance	Nom.Mutual Capacitance
330 pF/100m	17 pF/ft

#### Delay

Frequency [MHz]	Max. Delay	Max. Delay Skew	Nominal Velocity of Propagation (VP) [%]
16 MHz	543 ns/100m	45 ns/100m	61 %

## High Freq

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. NEXT [dB]	Min. PSNEXT [dB]	Min. ACR [dB]	Min. PSACR [dB]	Min. RL (Return Loss) [dB]	Max./Min. Fitted Impedance
0.772 MHz	2.2 dB/100m	47.0 dB	43.0 dB	50.1 dB	46.1 dB		
1 MHz	2.6 dB/100m	45.0 dB	41.0 dB	47.8 dB	43.8 dB	12.0 dB	100 ± 15 Ohm
4 MHz	5.6 dB/100m	36.0 dB	32.0 dB	36.0 dB	32.0 dB	12.0 dB	100 ± 15 Ohm
8 MHz	8.5 dB/100m	31.0 dB	28.0 dB	28.3 dB	24.3 dB	12.0 dB	100 ± 15 Ohm
10 MHz	9.7 dB/100m	30.0 dB	26.0 dB	26.2 dB	22.3 dB	12.0 dB	100 ± 15 Ohm
16 MHz	13.1 dB/100m	27.0 dB	23.0 dB	20.1 dB	16.1 dB	10.0 dB	100 ± 15 Ohm

#### Voltage

UL Voltage Rating 300 V RMS

# **Temperature Range**

Installation Temp Range:	0°C To +50°C
UL Temp Rating:	60°C
Storage Temp Range:	-30°C To +60°C
Operating Temp Range:	-30°C To +60°C

#### **Mechanical Characteristics**

Bulk Cable Weight:	415 lbs/1000ft
Max Recommended Pulling Tension:	600 lbs
Min Bend Radius During Installation:	15.5 in
Min Bend Radius/Minor Axis:	7.75 in

# **Standards**

NEC/(UL) Specification:	CMP
CEC/C(UL) Specification:	CMP

CPR Euroclass:	Fca
Data Category:	Category 3
ANSI Compliance:	S-90-661-2012 Category 3, ANSI/NEMA WC-63.1 Category 3
Telecommunications Standards:	ANSI/TIA-568-C.2 Category 3

#### **Applicable Environmental and Other Programs**

Environmental Space:	Plenum
EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2003/11/EC (BFR):	Yes
EU Directive 2003/96/EC (BFR):	Yes
EU Directive 2011/65/EU (ROHS II):	Yes
EU Directive 2012/19/EU (WEEE):	Yes
EU Directive 2015/863/EU:	Yes
EU Directive Compliance:	Yes
EU CE Mark:	Yes
EU REACH SVHC Compliance (yyyy-mm-dd):	2017-07-10
EU RoHS Compliance Date (yyyy-mm-dd):	2005-08-19
MII Order #39 (China RoHS):	Yes

#### Suitability

Suitability - Aerial:	No
Suitability - Burial:	No
Suitability - Hazardous Locations:	No
Suitability - Indoor:	Yes
Suitability - Non-Halogenated:	No
Suitability - Oil Resistance:	No
Suitability - Outdoor:	No
Suitability - Sunlight Resistance:	No

#### Flammability, LS0H, Toxicity Testing

C(UL) Flammability:	FT6
UL Flammability:	NFPA 262 Plenum (UL 910)
CSA Flammability:	FT6
UL voltage rating:	300 V RMS

#### Plenum/Non-Plenum

Plenum (Y/N): Yes	
-------------------	--

#### **Part Number**

Non-Plenum Number:	DIW100	

#### Variants

	Item #	Color	UPC	Length
С	DPLN100 732CUT	Olive	612825061014	
C	DPLN100 732CUT	Olive	612825061014	1 ft
F	Patent:			

#### **Product Notes**

Notes:	Print Includes Descending Footage/Meter Markings.

#### History

Update and Revision:	Revision Number: 0.311 Revision Date: 01-31-2020

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# **Detailed Specifications & Technical Data**

**ENGLISH MEASUREMENT VERSION** 



# CAD1100000 Cable Assemblies - CAT6A Performance Modular Cord

# **Preview Document. Not Live Data.**



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# **Description**

CAT6A Performance Patch Cord UTP, 4-Pair, 28 AWG Stranded, CMR, T568A/B-T568A/B, (See Product Family List for colors & lengths)

# Usage (Overall):

Suitable Applications	TIA Category 6A, ISO Class EA, 10GBASE-T
Related Parts	10GX Modular Jacks, 10GX RJ45 Couplers, 10GX Patch Panels

# **Multi Conductor:**

#### **Physical Characteristics:**

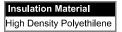
#### Conductor:

AWG

# Pairs	AWG	Stranding	Conductor Material
4	28	Stranded	Tinned Copper

#### Insulation:

Insulation Material



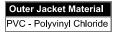
#### **Outer Shield:**

Outer Shield Material

Outer Shield Trade Name	Туре	Outer Shield Material
Floating Screen	Foil	AL - Aluminum

# Outer Jacket:

Outer Jacket Material



### **Overall Diameter:**

Overall Nominal Diameter: 0.186 in.

# **Cable Characteristics (Connectivity):**

Page 1 of 4 10-17-2018

# **Detailed Specifications & Technical Data**

**ENGLISH MEASUREMENT VERSION** 



# CAD1100000 Cable Assemblies - CAT6A Performance Modular Cord

#### **Outer Jacket:**

Outer Jacket Color Code Chart



# **Physical Characteristics (Connectivity):**

#### Materials:

Materials

Description	Type	Material
Plug	RJ45	Polycarbonate - UL94V-0
Boot		Polycarbonate - UL94V-0
Front Connection	Blades	Phosphor Bronze with 50u inch Gold over Nickel Plating

Color:

Boot Color Translucent

Wiring Scheme:

Wiring Scheme T568A/B-T568A/B

Packaging:

Packaging Individually packaged in a clear plastic bag.

# **Mechanical Characteristics (Connectivity):**

Plug / Jack Compatibility RJ45

Termination Interface

Termination		Connection	Durabilities	
	RJ45	Mated Connection	750 Cycles	

Storage Temperature Range	-40°C To +75°C
Installation Temperature Range	0°C To +60°C
Operating Temperature Range	-20°C To +75°C
Max. Recommended Pull Tension:	11.250 lbs.
Min. Bend Radius (Overall Cable):	0.744 in.

# Applicable Specifications and Agency Compliance (Overall):

**Applicable Standards & Environmental Programs:** 

UL Rating	Riser
Other Standards	FCC Part 68, Subpart F, IEC 60603-7
EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	01/01/2006
MII Order #39 (China RoHS)	EUP 50
Telecommunications Standards	ISO/IEC 11801:2002 Amendment 2
Safety Listing	c(UL)us Listed
Guitability:	
Suitability - Indoor	Yes

# **Transmission Characteristics (Connectivity):**

Performance Table 1

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# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



# CAD1100000 Cable Assemblies - CAT6A Performance Modular Cord

Frequency (MHz)	Max. Insertion Loss TIA* (dB)	Max. Insertion Loss Belden (dB)		Min PSNEXT Belden (dB)		Min. PSACRF Belden (dB)
1.000	2.500	4.000	72.300	72.300	64.800	64.800
4.000	4.600	7.200	63.300	63.300	52.800	52.800
8.000	6.400	10.100	58.800	58.800	46.700	46.700
10.000	7.100	11.300	57.300	57.300	44.800	44.800
16.000	9.000	14.200	54.200	54.200	40.700	40.700
20.000	10.100	15.900	52.800	52.800	38.800	38.800
25.000	11.300	17.800	51.300	51.300	36.800	36.800
31.250	12.600	20.000	49.900	49.900	34.900	34.900
62.500	18.000	28.500	45.400	45.400	28.900	28.900
100.000	22.900	36.400	42.300	42.300	24.800	24.800
200.000	33.100	52.400	37.800	37.800	18.800	18.800
250.000	37.300	59.000	36.300	36.300	16.800	16.800
300.000	41.200	65.100	35.100	35.100	15.300	15.300
400.000	48.100	76.100	33.300	33.300	12.800	12.800
500.000	54.400	86.000	31.800	31.800	10.800	10.800

Performance Table - Footnote

100 Meter Cable Specifications - \* TIA/EIA-568-C.2-2009 Category 6A Standard

#### Performance Table 2

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden (dB)	Min. PSANEXT TIA* (dB)	Min. PSANEXT Belden (dB)	Min. PSAACR-F TIA* (dB)	Min. PSAACR-F Belden (dB)	Min. Balanced TCL TIA* (dB)	Min. Balanced TCL Belden (dB)
1.000	20.000	20.000	67.000	67.000	67.000	67.000	40.000	40.000
4.000	23.000	23.000	67.000	67.000	66.200	66.200	40.000	40.000
8.000	24.500	24.500	67.000	67.000	60.100	60.100	40.000	40.000
10.000	25.000	25.000	67.000	67.000	58.200	58.200	40.000	40.000
16.000	25.000	25.000	67.000	67.000	54.100	54.100	38.000	38.000
20.000	25.000	25.000	67.000	67.000	52.200	52.200	37.000	37.000
25.000	24.200	24.200	67.000	67.000	50.200	50.200	36.000	36.000
31.250	23.300	23.300	67.000	67.000	48.300	48.300	35.100	35.100
62.500	20.700	20.700	65.600	65.600	42.300	42.300	32.000	32.000
100.000	19.000	19.000	62.500	62.500	38.200	38.200	30.000	30.000
200.000	16.400	16.400	58.000	58.000	32.200	32.200	27.000	27.000
250.000	15.600	15.600	56.500	56.500	30.200	30.200	26.000	26.000
300.000	14.900	14.900	55.300	55.300	28.700	28.700	25.200	25.200
400.000	13.800	13.800	53.500	53.500	26.200	26.200	24.000	24.000
500.000	13.000	13.000	52.000	52.000	24.200	24.200	23.000	23.000

Dielectric Strength 1,000 V RMS @ 60 Hz for 1 minute

Current Rating:	1.500 A
Insulation Resistance	500 M-Ohm Minimum
Max. Contact Resistance	20 m-Ohm

# **Electrical Characteristics (Overall):**

# Labeling:

Labeling: Belden Part Number and Cord Length. Labeling

Notes (Overall):

Notes

- CAD1106000 is subdivided as following CA-D1-1-00-000 CA stands for performance, D1 stands for cable type, 1 stands for termination type, 00 stands for color, 000 stands for lengt Use last 3 digits of the code to specify length in feet - 001-015 ft in increments of 1 ft than 20 ft or 25 ft.
- 28 AWG stranded conductors are not TIA-568 compliant. However, using maximum 6.3 meters of cordage connected to a 9 meters permanent link will meet all TIA channel requirements.

Notes (Cont'd.) Cable Weight: 0.0152 lbs/ft.

# **Detailed Specifications & Technical Data**

**ENGLISH MEASUREMENT VERSION** 



#### CAD1100000 Cable Assemblies - CAT6A Performance Modular Cord

## **Product Family:**

**Product List** 

Length	Black	Red	Orange	Yellow	Green	Blue	Gray	White
								CAD1109002
3 ft. (0.9 m)	CAD1100003	CAD1102003	CAD1103003	CAD1104003	CAD1105003	CAD1106003	CAD1108003	CAD1109003
4 ft. (1.2 m)	CAD1100004	CAD1102004	CAD1103004	CAD1104004	CAD1105004	CAD1106004	CAD1108004	CAD1109004
5 ft. (1.5 m)	CAD1100005	CAD1102005	CAD1103005	CAD1104005	CAD1105005	CAD1106005	CAD1108005	CAD1109005
6 ft. (1.8 m)	CAD1100006	CAD1102006	CAD1103006	CAD1104006	CAD1105006	CAD1106006	CAD1108006	CAD1109006
, ,					CAD1105007			
								CAD1109008
								CAD1109009
10 ft. (3.0 m)	CAD1100010	CAD1102010	CAD1103010	CAD1104010	CAD1105010	CAD1106010	CAD1108010	CAD1109010
12 ft. (3.6 m)	CAD1100012	CAD1102012	CAD1103012	CAD1104012	CAD1105012	CAD1106012	CAD1108012	CAD1109012
, ,								CAD1109015
25 ft. (7.6 m)	CAD1100025	CAD1102025	CAD1103025	CAD1104025	CAD1105025	CAD1106025	CAD1108025	CAD1109025

Revision Number: 0 Revision Date: 10-17-2018

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# **Detailed Specifications & Technical Data**

**ENGLISH MEASUREMENT VERSION** 



# CA21100000 Cable Assemblies - 10GX Modular Cord

#### **Preview Document. Not Live Data.**





For more Information please call

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#### Description

10GX Patch Cord, Bonded-Pair, 4-Pair, 24 AWG Solid, CMR, T568A/B-T568A/B

# Usage (Overall):

Suitable Applications	IBDN System 10GX, TIA Category 6A, ISO Class EA, 10GBASE-T
Related Parts	10GX Modular Jacks, 10GX Patch Panels

#### **Multi Conductor:**

#### **Physical Characteristics:**

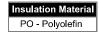
#### Conductor:

AWG

# Pairs	AWG	Stranding	Conductor Material
4	24	Solid	BC - Bare Copper

## Insulation:

Insulation Material



# Inner Jacket:

Inner Jacket Material



#### Outer Shield:

Outer Shield Material

Outer Shield Trade Name	Туре	Outer Shield Material
Floating Screen	Foil	AL - Aluminum

# **Outer Jacket:**

**Outer Jacket Material** 



Outer Jacket Color Code Chart



# **Overall Cabling:**

Overall Cabling Fillers Cross Web

Overall Diameter:		
Overall Nominal Diameter:	0.265 in.	
Individual Cable Diameter:	0.265 in.	

# **Physical Characteristics (Connectivity):**

#### Materials:

Materials

|--|

Page 1 of 4 01-13-2015

# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



# CA21100000 Cable Assemblies - 10GX Modular Cord

Plug	RJ45	Polycarbonate	
Boot		Elastomer	
Front Connection	Blades	Phosphor Bronze with 50u inch Gold over Nickel Plating	

Color:

Translucent **Boot Color** Wiring Scheme: T568A/B-T568A/B

Wiring Scheme

Weight: 0.380 lbs. Weight:

Packaging:

Individually packaged in a clear plastic bag. Packaging

**Mechanical Characteristics (Connectivity):** 

Plug / Jack Compatibility RJ45

Termination Interface

Termination	Connection	Durabilities
RJ45	Mated Connection	750 Cycles

Storage Temperature Range	-40°C To +70°C
Installation Temperature Range	-10°C To +60°C
Operating Temperature Range	-10°C To +60°C
Max. Recommended Pull Tension:	25 lbs.
Min. Bend Radius (Overall Cable):	1.040 in.

# Applicable Specifications and Agency Compliance (Overall):

**Applicable Standards & Environmental Programs:** 

ÜL Rating	Riser
Other Standards	FCC Part 68, Subpart F, IEC 60603-7
EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	01/01/2006
MII Order #39 (China RoHS)	EUP 50
Telecommunications Standards	ISO/IEC 11801:2002 Amendment 2
Safety Listing	Bi-national Standard Listed
Guitability:	
Suitability - Indoor	Yes

# **Transmission Characteristics (Connectivity):**

#### Performance Table 1

Frequency (MHz)	Max. Insertion Loss TIA* (dB)	Max. Insertion Loss Belden (dB)	-	Min PSNEXT Belden (dB)		Min. PSACRF Belden (dB)
1.000	2.500	2.400	72.300	72.300	64.800	64.800
4.000	4.600	4.500	63.300	63.300	52.800	52.800
8.000	6.400	6.300	58.800	58.800	46.700	46.700
10.000	7.100	7.000	57.300	57.300	44.800	44.800
16.000	9.000	8.900	54.200	54.300	40.700	40.700
20.000	10.100	10.000	52.800	52.800	38.800	38.800
25.000	11.300	11.100	51.300	51.300	36.800	36.800
31.250	12.600	12.500	49.900	49.900	34.900	34.900
62.500	18.000	17.900	45.400	45.400	28.900	28.900

Page 2 of 4

# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



# CA21100000 Cable Assemblies - 10GX Modular Cord

100.000	22.900	22.800	42.300	42.300	24.800	24.800
200.000	33.100	33.000	37.800	37.800	18.800	20.900
250.000	37.300	37.200	36.300	36.300	16.800	16.800
300.000	41.200	41.000	35.100	35.200	15.300	15.300
400.000	48.100	48.000	33.300	33.300	12.800	13.900
500.000	54.400	54.300	31.800	31.800	10.800	11.700
625.000		61.500		30.400		8.800

Performance Table - Footnote

100 Meter Cable Specifications - \* TIA/EIA-568-C.2-2009 Category 6A Standard

#### Performance Table 2

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden (dB)	Min. PSANEXT TIA* (dB)	Min. PSANEXT Belden (dB)	Min. PSAACR-F TIA* (dB)	Min. PSAACR-F Belden (dB)	Min. Balanced TCL TIA* (dB)	Min. Balanced TCL Belden (dB)
1.000	20.000	20.000	67.000	87.000	67.000	75.000	40.000	48.000
4.000	23.000	23.000	67.000	87.000	66.200	75.000	40.000	48.000
8.000	24.500	24.500	67.000	87.000	60.100	75.000	40.000	48.000
10.000	25.000	25.000	67.000	87.000	58.200	75.000	40.000	48.000
16.000	25.000	25.000	67.000	87.000	54.100	70.900	38.000	46.000
20.000	25.000	25.000	67.000	87.000	52.200	69.000	37.000	45.000
25.000	24.200	25.000	67.000	87.000	50.200	67.000	36.000	44.000
31.250	23.300	25.000	67.000	87.000	48.300	65.100	35.100	43.100
62.500	20.700	25.000	65.600	85.600	42.300	59.100	32.000	40.000
100.000	19.000	25.000	62.500	82.500	38.200	55.000	30.000	38.000
200.000	16.400	21.000	58.000	78.000	32.200	49.000	27.000	35.000
250.000	15.600	20.500	56.500	76.500	30.200	47.000	26.000	34.000
300.000	14.900	20.100	55.300	75.300	28.700	43.800	25.200	33.200
400.000	13.800	19.500	53.500	73.500	26.200	38.800	24.000	32.000
500.000	13.000	18.400	52.000	72.000	24.200	35.000	23.000	31.000
625.000		17.400		65.000		31.100		

1,000 V RMS @ 60 Hz for 1 minute Dielectric Strength

Current Rating:	1.500 A
Insulation Resistance	500 M-Ohm Minimum
Max. Contact Resistance	20 m-Ohm

# **Electrical Characteristics (Overall):**

# Labeling:

Labeling: Belden Part Number, Performance Acronym, Wiring Scheme and Cord Length Labeling

# Notes (Overall):

Notes

CA21100000 is subdivided as following CA-21-1-00-000 CA stands for performance, 21 stands for cable type, 1 stands for terminatio type, 00 stands for color, 000 stands for length Use last 3 digits of the code to specify length in feet - 001-015 ft in increments of 1 ft than 20 ft or 25 ft

Notes (Cont'd.)

Cable Weight: 0.026 lbs/ft.

# **Product Family:**

**Product List** 

Length	Yellow	Green	Blue	Gray	White	Black
2 ft. (0.6 m)	CA21104002	CA21105002	CA21106002	CA21108002	CA21109002	CA21100002
						CA21100003
4 ft. (1.2 m)	CA21194004	CA21105004	CA21106004	CA21108004	CA21109004	CA21100004
5 ft (1.5 m)	CA21104005	CA21105005	CA21106005	CA21108005	CA21109005	CA21100005
						CA21100006
7 ft. (2.1 m)	CA21104007	CA21105007	CA21106007	CA21108007	CA21109007	CA21100007
8 ft (2.4 m)	CA21104008	CA21105008	CA21106008	CA21108008	CA21109008	CA21100008
9 ft (2.7 m)	CA21104009	CA21105009	CA21106009	CA21108009	CA21109009	CA21100009
						CA21100010
, , ,					l .	CA21100012
, , ,						CA21100015
25 ft. (7.6 m)	CA21104025	CA21105025	CA21106025	CA21108025	CA21109025	CA21100025

Revision Number: 0 Revision Date: 05-22-2014

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**ENGLISH MEASUREMENT VERSION** 



#### CA21100000 Cable Assemblies - 10GX Modular Cord

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#### C6D1100000 Cable Assemblies - CAT6 Performance Modular Cord

#### **Preview Document. Not Live Data.**



For more Information please call

1-800-Belden1



#### **Description**

CAT6 Performance Patch Cord UTP, 4 Pair, 28 AWG Stranded, CMR, T568A/B-T568A/B, (See Product Family List for colors & lengths)

#### Usage (Overall):

Suitable Applications	TIA Category 6, ISO Class E, 1000BASE-T
Related Parts	CAT6+ Modular Jacks, CAT6+ RJ45 Couplers, CAT6+ Patch Panels

#### **Multi Conductor:**

#### **Physical Characteristics:**

#### Conductor:

AWG

# Pairs	AWG	Stranding	Conductor Material
4	28	Stranded	Tinned Copper

#### Insulation:

Insulation Material



#### **Outer Jacket:**

Outer Jacket Material

Outer Jacket Material
PVC - Polyvinyl Chloride

#### **Overall Diameter:**

Overall Nominal Diameter: 0.15 in.

#### **Cable Characteristics (Connectivity):**

#### **Outer Jacket:**

Outer Jacket Color Code Chart

Color

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**ENGLISH MEASUREMENT VERSION** 



#### C6D1100000 Cable Assemblies - CAT6 Performance Modular Cord

See Product Family

#### **Physical Characteristics (Connectivity):**

#### Materials:

Materials

Description	Туре	Material
Plug	RJ45	Polycarbonate - UL94V-0
Boot		Polycarbonate - UL94V-0
Front Connection	Blades	Phosphor Bronze with 50u inch Gold over Nickel Plating

#### Color:

Boot Color Translucent

Wiring Scheme:

Wiring Scheme T568A/B-T568A/B

Packaging:

Packaging Individually packaged in a clear plastic bag.

#### **Mechanical Characteristics (Connectivity):**

Plug / Jack Compatibility RJ45

Termination Interface

Termination	Connection	Durabilities
RJ45	Mated Connection	750 Cycles

Storage Temperature Range	-40°C To +75°C
Installation Temperature Range	0°C To +60°C
Operating Temperature Range	-20°C To +75°C
Max. Recommended Pull Tension:	11.250 lbs.
Min. Bend Radius (Overall Cable):	0.580 in.

#### Applicable Specifications and Agency Compliance (Overall):

Applicable Standards & Environmental Programs:

UL Rating	Riser	
Other Standards	FCC Part 68, Subpart F, IEC 60603-7	
EU Directive 2002/95/EC (RoHS)	Yes	
EU RoHS Compliance Date (mm/dd/yyyy)	01/01/2006	
MII Order #39 (China RoHS)	EUP 50	
Telecommunications Standards	Category 6 - TIA 568.C.2, ISO/IEC 11801:2002 Ed.2	
Safety Listing	c(UL)us Listed	
Suitability:		
Suitability - Indoor	Yes	

#### **Transmission Characteristics (Connectivity):**

#### Performance Table 1

, ,	Insertion Loss	Insertion Loss	PSNEXT	PSNEXT	PSACRF	Min. PSACRF Belden (dB)
1.000	2.400	3.800	72.300	72.300	64.800	64.800
4.000	4.500	7.200	63.300	63.300	52.800	52.700

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# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



#### C6D1100000 Cable Assemblies - CAT6 Performance Modular Cord

8.000	6.400	10.100	58.800	58.800	46.700	46.700
10.000	7.100	11.300	57.300	57.300	44.800	44.800
16.000	9.100	14.400	54.200	54.300	40.700	40.700
20.000	10.200	16.100	52.800	52.800	38.800	38.700
25.000	11.400	18.100	51.300	51.300	36.800	36.800
31.250	12.800	20.300	49.900	49.900	34.900	34.900
62.500	18.500	29.200	45.400	45.400	28.900	28.800
100.000	23.800	37.600	42.300	42.300	24.800	24.800
200.000	34.800	55.100	37.800	37.800	18.800	18.700
250.000	39.400	62.400	36.300	36.300	16.800	16.800

Performance Table - Footnote

100 Meter Cable Specifications - \* TIA-EIA-568-C.2 Category 6 Standard ------PSACRF is formally PSELFEXT

#### Performance Table 2

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden (dB)	Min. Balanced TCL TIA* (dB)	Min. Balanced TCL Belden (dB)
1.000	20.000	20.000	40.000	40.000
4.000	23.000	23.000	40.000	40.000
8.000	24.500	24.500	40.000	40.000
10.000	25.000	25.000	40.000	40.000
16.000	25.000	25.000	38.000	38.000
20.000	25.000	25.000	37.000	37.000
25.000	24.200	24.300	36.000	36.000
31.250	23.300	23.600	35.100	35.100
62.500	20.700	21.500	32.000	32.000
100.000	19.000	20.100	30.000	30.000
200.000	16.400	18.000	27.000	27.000
250.000	15.600	17.300	26.000	26.000

Dielectric Strength 1,000 V RMS @ 60 Hz for 1 minute Current Rating: 1.500 A 500 M-Ohm Minimum Insulation Resistance Max. Contact Resistance 20 m-Ohm

#### **Electrical Characteristics (Overall):**

#### Labeling:

Labeling: Belden Part Number and Cord Length. Labeling

#### Notes (Overall):

Notes

- C6D1100000 is subdivided as following C6-D1-1-00-000 C6 stands for performance, D1 stands for cable type, 1 stands for termination type, 00 stands for color, 000 stands for length Use last 3 digits of the code to specify length in feet - 001-015 ft in increments of 1 ft than 20 ft or 25 ft. xxx stands for special required length.
- 28 AWG stranded conductors are not TIA-568 compliant. However, using maximum 6.3 meters of cordage connected to a 9 meters permanent link will meet all TIA channel requirements.

Weight: 0.012 Lbs/ft. www.belden.com/p Notes (Cont'd.)

#### **Product Family:**

**Product List** 

Length	Black	Red	Yellow	Green	Blue	Gray	White
, ,	C6D1100002						
	C6D1100003						
, ,	C6D1100004						
	C6D1100005						
, ,	C6D1100006						
, ,	C6D1100007						
8 ft. (2.4 m)	C6D1100008	C6D1102008	C6D1104008	C6D1105008	C6D1106008	C6D1108008	C6D1109008

**ENGLISH MEASUREMENT VERSION** 



#### C6D1100000 Cable Assemblies - CAT6 Performance Modular Cord

9 ft. (2.7 m) C6D1100009C6D1102009C6D1104009C6D1105009C6D1106009C6D1108009C6D1109009 10 ft. (3.0 m) C6D1100010 C6D1102010C6D1104010C6D1105010C6D1106010C6D1108010C6D1109010 12 ft. (3.6 m) C6D1100012 C6D1102012C6D1104012C6D1105012C6D1106012C6D1108012C6D1109012 15 ft. (4.6 m) C6D1100015C6D1102015C6D1104015C6D1105015C6D1106015C6D1108015C6D1109015 25 ft. (7.6 m) C6D1100025C6D1102025C6D1104025C6D1105025C6D1106025C6D1108025C6D1109025

Revision Number: 0 Revision Date: 10-17-2018

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#### **METRIC MEASUREMENT VERSION**



#### C601100000 Cable Assemblies - CAT6+ Modular Cord







For more Information please call

1-800-Belden1



#### **General Description:**

CAT6+ Patch Cord, Bonded-Pair, 4 Pair, 24 AWG Solid, CMR, T568A/B-T568A/B

#### Usage (Overall)

Suitable Applications: IBDN System 4800, IBDN System 3600, IBDN System 2400, TIA Category 6, ISO Class E, 1000BASE-T Related Parts: CAT6+ Modular Jacks, CAT6+ RJ45 Couplers, CAT6+ Patch Panels

#### **Multi Conductor**

#### **Physical Characteristics**

#### Conductor

AWG:

# Pairs	AWG	Stranding	Conductor Material
4	24	Solid	BC - Bare Copper

#### Insulation

Insulation Material:



#### **Outer Jacket**

Outer Jacket Material:

**Outer Jacket Material** PVC - Polyvinyl Chloride

#### **Overall Cabling**

**Overall Cabling Fillers:** Cross Web

#### **Overall Diameter**

Overall Nominal Diameter: 6.045 mm

#### **Physical Characteristics (Connectivity)**

# Materials

#### Materials:

Description	Type	Material
Plug	RJ45	Polycarbonate
Boot		Elastomer
Front Connection	Blades	Phosphor Bronze with 50u inch Gold over Nickel Plating

#### Color

**Boot Color:** Translucent

#### Wiring Scheme

Wiring Scheme: T568A/B-T568A/B

## Packaging

Packaging: Individually packaged in a clear plastic bag.

#### **Mechanical Characteristics (Connectivity)**

Plug / Jack Compatibility: RJ45

#### Termination Interface:

Terminatio	on Connection	Durabilities
RJ45	Mated Connection	750 Cycles
Storage	Temperature Range	:
Installati	on Temperature Rar	ude.
motanati	on remperature ital	ige.
Operatin	g Temperature Rang	ge:
Max. Red	commended Pull Ter	nsion:
Min. Ben	d Radius (Overall C	able):

Page 1 of 3

#### **METRIC MEASUREMENT VERSION**



#### C601100000 Cable Assemblies - CAT6+ Modular Cord

#### Applicable Specifications and Agency Compliance (Overall) **Applicable Standards & Environmental Programs** UL Rating: Riser Other Standards: FCC Part 68, Subpart F, IEC 60603-7 EU Directive 2002/95/EC (RoHS): EU RoHS Compliance Date (mm/dd/yyyy): 01/01/2006 MII Order #39 (China RoHS): EUP 50 Telecommunications Standards: Category 6 - TIA 568.C.2, ISO/IEC 11801:2002 Ed.2 Safety Listing: Bi-national Standard Listed Suitability Suitability - Indoor: Yes

#### **Transmission Characteristics (Connectivity)**

#### Performance Table 1:

Frequency (MHz)	Max. Insertion Loss TIA* (dB)	Max. Insertion Loss Belden (dB)	Min. PSNEXT TIA* (dB)	Min PSNEXT Belden (dB)	Min. PSACRF TIA* (dB)	Min. PSACRF Belden (dB)
1.000	2.400	2.000	72.300	73.300	64.800	67.800
4.000	4.500	3.700	63.300	64.300	52.800	55.800
8.000	6.400	5.200	58.800	61.300	46.700	49.700
10.000	7.100	5.900	57.300	59.800	44.800	47.800
16.000	9.100	7.400	54.200	56.600	40.700	43.700
20.000	10.200	8.300	52.800	55.100	38.800	41.800
25.000	11.400	9.300	51.300	53.500	36.800	39.800
31.250	12.800	10.400	49.900	52.000	34.900	37.900
62.500	18.500	14.900	45.400	47.100	28.900	31.900
100.000	23.800	19.000	42.300	43.800	24.800	27.800
200.000	34.800	27.500	37.800	38.900	18.800	21.800
250.000	39.400	31.000	36.300	37.300	16.800	19.800
300.000		34.200		36.100		18.300

Performance Table - Footnote:

100 Meter Cable Specifications - \* TIA-EIA-568-C.2 Category 6 Standard ——— PSACRF is formally PSELFEXT

#### Performance Table 2:

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden (dB)	Min. Balanced TCL TIA* (dB)	Min. Balanced TCL Belden (dB)
1.000	20.000	20.000	40.000	40.000
4.000	23.000	23.000	40.000	40.000
8.000	24.500	24.500	40.000	40.000
10.000	25.000	25.000	40.000	40.000
16.000	25.000	25.000	38.000	38.000
20.000	25.000	25.000	37.000	37.000
25.000	24.200	24.300	36.000	36.000
31.250	23.300	23.600	35.100	35.100
62.500	20.700	21.500	32.000	32.000
100.000	19.000	20.800	30.000	30.000
200.000	16.400	18.700	27.000	27.000
250.000	15.600	18.000	26.000	26.000
300.000		17.500		

**Dielectric Strength:** 1,000 V RMS @ 60 Hz for 1 minute

 Current Rating:
 1.500 A

 Insulation Resistance:
 500 M-Ohm Minimum

 Max. Contact Resistance:
 20 m-Ohm

#### **Electrical Characteristics (Overall)**

# Labeling

Labeling: Labeling: Belden Part Number, Performance Acronym, Wiring Scheme and Cord Length.

#### Notes (Overall)

Notes: C601100000 is subdivided as following C6-01-1-00-000 C6 stands for performance, 01 stands for cable type, 1 stands for termination type, 00 stands for color, 000 stands for length Use last 3 digits of the code to specify length in feet - 001-015 ft in increments of 1 ft than 20 ft or 25 ft, xxx stands for special required length.

Page 2 of 3 01-09-2015

#### **METRIC MEASUREMENT VERSION**



#### C601100000 Cable Assemblies - CAT6+ Modular Cord

Notes (Cont'd.): Weight: 0.027 Lbs/ft. www.belden.com/p

#### **Product Family**

#### Product List:

Length	Yellow	Green	Blue	Gray	White	Black	Purple
2 ft. (0.6 m)	C601104002	C601105002	C601106002	C601108002	C601109002	C601100002	C601107002
4 ft. (1.2 m)	C601104004	C601105004	C601106004	C601108004	C601109004	C601100004	C601107004
7 ft. (2.1 m)	C601104007	C601105007	C601106007	C601108007	C601109007	C601100007	C601107007
10 ft. (3.0 m)	C601104010	C601105010	C601106010	C601108010	C601109010	C601100010	C601107010
15 ft. (4.6 m)	C601104015	C601105015	C601106015	C601108015	C601109015	C601100015	C601107015
25 ft. (7.6 m)	C601104025	C601105025	C601106025	C601108025	C601109025	C601100025	C601107025
xxx	C601104xxx	C601105xxx	C601106xxx	C601108xxx	C601109xxx	C601100xxx	C601107xxx

#### **Put Ups and Colors:**

Marian Al	Dutum	Chin Wainht	Calas	Madaa	Ham Dana
Item #	Putup	Ship Weight	Color	Notes	Item Desc
	The state of the s				

Revision Number: 0 Revision Date: 03-11-2014

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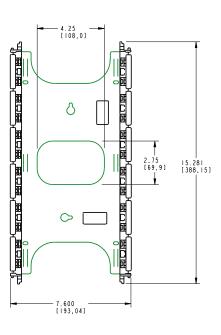
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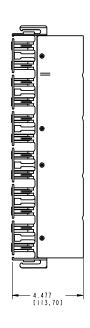
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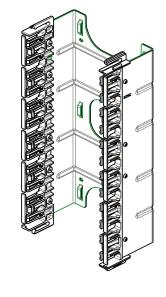
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INFORMATION SUR LE PRODUIT PRODUCT INFO Numéro de Pièce Part number CODE DU PRODUIT PRODUCT CODE DESCRIPTION AX101472 NXXCB12C GIGABIX MOUNT FOR 12 CONN AASY

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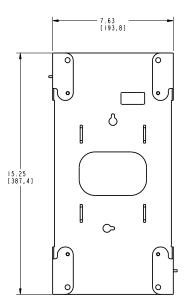
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NXXCB12C TYPE GIGABIX MOUNT FOR 12 CONN ASSY NUMÉRO DE DESSIN/DRAWING NUMBER

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INFORMATION SUR LE PRODUIT PRODUCT INFO				
Numéro de Pièce Part number	CODE DU PRODUIT PRODUCT CODE	DESCRIPTION		
AX101469	NXXCBCMM	CABLE MODULE ASS'Y		

NOTES

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NXXCBCMM TYPE CABLE MODULE ASS'Y

NUMÉRO DE DESSIN/DRAWING NUMBER

BELDEN-077

METRIC MEASUREMENT VERSION



#### AX101447 Modular Connectors - GIGABIX CONNECTOR 6-PORT

For more Information please call

1-800-Belden1



#### **General Description:**

**GIGABIX CONNECTOR 6-PORT** 

# Usage (Overall)

Suitable Applications:	IBDN System 4800, 3600, 2400, TIA Category 6, ISO Class E, 1000BASE-T
Related Parts:	Compatible with GigaBIX patch cord, GigaBIX termination kit, GigaBIX rack mount panel, designation strips, wire guard

#### **Physical Characteristics (Connectivity)**

#### **Dimensions**

#### **Dimensions:**

Height (mm)	Width (mm)	Depth (mm)
7.874	168.402	32.512

#### Materials

#### Materials:

Description	Туре	Material
Front Connection	IDC	Copper Allow with Nickel Plating
Rear Connection	IDC	Copper Allow with Nickel Plating
Connector Body		Plastic - UL940V-0

#### Weight

Weight: 0.050 kg

#### **Packaging**

Packaging: packaged in carton. Standard pack of 12 units.

#### **Mechanical Characteristics (Connectivity)**

#### Termination Interface:

Termination	Connection	Durabilities
Front	Gas Tight IDC Connection	200 terminations
Rear	Gas Tight IDC Connection	200 terminations

Storage Temperature Range:	-40°C To +70°C
Installation Temperature Range:	-10°C To +60°C
Operating Temperature Range:	-10°C To +60°C
Tool Compatibility:	BIX Connecting Tool (A0270165)

#### **Applicable Specifications and Agency Compliance (Overall)**

#### **Applicable Standards & Environmental Programs**

Other Standards:	FCC Part 68, Subpart F, IEC 60603-7
EU Directive 2002/95/EC (RoHS):	Yes
EU RoHS Compliance Date (mm/dd/yyyy):	07/01/2006
Telecommunications Standards:	Category 6 - TIA 568.C.2, Class E - ISO/IEC 11801:2002
Third Party Performance Verification:	ETL - Verified Category 6
Safety Listing:	ACA, Bi-national Standard Listed

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#### METRIC MEASUREMENT VERSION



#### AX101447 Modular Connectors - GIGABIX CONNECTOR 6-PORT

Suitability

Suitability - Indoor: Yes - Indoor

#### **Transmission Characteristics (Connectivity)**

#### **Mated Connection Table 1:**

Frequency (MHz)		Max. Insertion Loss Belden** (dB)		Min. NEXT TIA* (dB)	Min. NEXT Belden** (dB)	Min. FEXT TIA* (dB)	Min. FEXT Belden** (dB)
100.000	0.200	0.180	55.900	54.000	58.900	43.100	58.800

Mated Connection Table - Footnote:

\* TIA/EIA-568-C-2 Category 6 Standard.

#### Mated Connection Table 2:

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden** (dB)
100.000	24.000	37.300

Dielectric Strength:

1,000 V RMS @ 60 Hz for 1 minute

Current Rating: 1.500 A

Insulation Resistance: 100 M-Ohm Minimum

Max. Contact Resistance: 1 m-Ohm

#### **Notes (Overall)**

Notes: For proper installation refer to Installation Guide PX101813 (French) or PX101814 (English) included with the product or visit our web site at http://www.belden.com

Notes (Cont'd.):

Suitable for 22 to 26 Wire Gauge.

#### **Product Family**

#### Part Number List:

Description	Item Number
GigaBIX Connectors - 6 ports	AX101447
GigaBIX Connectors - 25 pairs	AX101448

#### **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
AX101447	1 EA	0.050 KG			GIGABIX CONN POLARIZED 4-PAIR

Revision Number: 0 Revision Date: 01-17-2011

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#### **ENGLISH MEASUREMENT VERSION**



#### AX101448 Modular Connectors - GIGABIX CONNECTOR 25-PAIR

For more Information please call

1-800-Belden1



#### **General Description:**

**GIGABIX CONNECTOR 25-PAIR** 

## **Usage (Overall)**

Suitable Applications:	IBDN System 4800, 3600, 2400, TIA Category 6, ISO Class E, 1000BASE-T
Related Parts:	Compatible with GigaBIX patch cord, GigaBIX termination kit, GigaBIX rack mount panel, designation strips, wire guard

#### **Physical Characteristics (Connectivity)**

#### **Dimensions**

#### **Dimensions:**

Height (in.)	Width (in.)	Depth (in.)
0.310	6.630	1.280

#### Materials

#### Materials:

Description	Туре	Material
Front Connection	IDC	Copper Allow with Nickel Plating
Rear Connection	IDC	Copper Allow with Nickel Plating
Connector Body		Plastic - UL940V-0

#### Weight

Weight: 0.110 lbs.

#### **Packaging**

Packaging: packaged in carton. Standard pack of 12 units.

#### **Mechanical Characteristics (Connectivity)**

#### Termination Interface:

Termination	Connection	Durabilities
Front	Gas Tight IDC Connection	200 terminations
Rear	Gas Tight IDC Connection	200 terminations

Storage Temperature Range:	-40°C To +70°C
Installation Temperature Range:	-10°C To +60°C
Operating Temperature Range:	-10°C To +60°C
Tool Compatibility:	BIX Connecting Tool (A0270165)

#### **Applicable Specifications and Agency Compliance (Overall)**

#### **Applicable Standards & Environmental Programs**

Other Standards:	FCC Part 68, Subpart F, IEC 60603-7	
EU Directive 2002/95/EC (RoHS):	Yes	
EU RoHS Compliance Date (mm/dd/yyyy):	07/01/2006	
Telecommunications Standards:	Category 6 - TIA 568.C.2, Class E - ISO/IEC 11801:2002	
Third Party Performance Verification:	ETL - Verified Category 6	
Safety Listing:	ACA, Bi-national Standard Listed	

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#### **ENGLISH MEASUREMENT VERSION**



#### **AX101448 Modular Connectors - GIGABIX CONNECTOR 25-PAIR**

Suitability

Suitability - Indoor: Yes - Indoor

#### **Transmission Characteristics (Connectivity)**

#### **Mated Connection Table 1:**

	Insertion Loss	Max. Insertion Loss Belden** (dB)		Min. NEXT TIA* (dB)	NEXT	Min. FEXT TIA* (dB)	Min. FEXT Belden** (dB)
100.000	0.200	0.180	55.900	54.000	58.900	43.100	58.800

Mated Connection Table - Footnote:

\* TIA/EIA-568-C-2 Category 6 Standard.

#### Mated Connection Table 2:

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden** (dB)
100.000	24.000	37.300

Dielectric Strength:

1,000 V RMS @ 60 Hz for 1 minute

Current Rating: 1.500 A

Insulation Resistance: 100 M-Ohm Minimum

Max. Contact Resistance: 1 m-Ohm

#### Notes (Overall)

Notes: For proper installation refer to Installation Guide PX101813 (French) or PX101814 (English) included with the product or visit our web site at http://www.belden.com

Notes (Cont'd.):

Suitable for 22 to 26 Wire Gauge.

#### **Product Family**

#### Part Number List:

Description	Item Number
GigaBIX Connectors - 6 ports	AX101447
GigaBIX Connectors - 25 pairs	AX101448

#### **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
AX101448	1 EA	0.222 LB			GIGABIX CONN POLARIZED 25-PAIR

Revision Number: 0 Revision Date: 03-30-2010

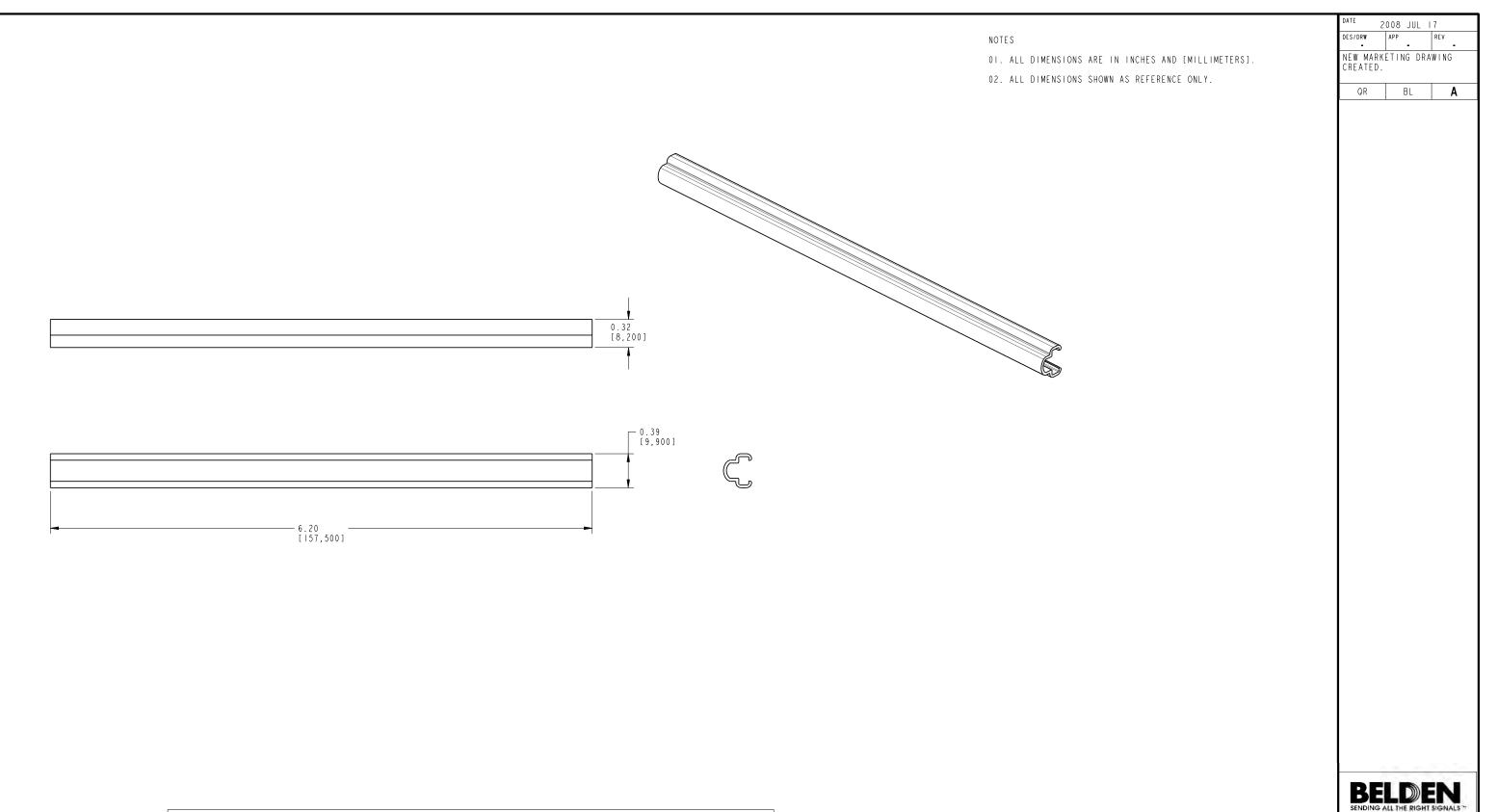
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INFORMATION SUR LE PRODUIT PRODUCT INFO			
Numéro de Pièce Part number	CODE DU PRODUIT PRODUCT CODE	DESCRIPTION	
AX101486	NXXCBWG	GIGABIX WIRE GUARD	

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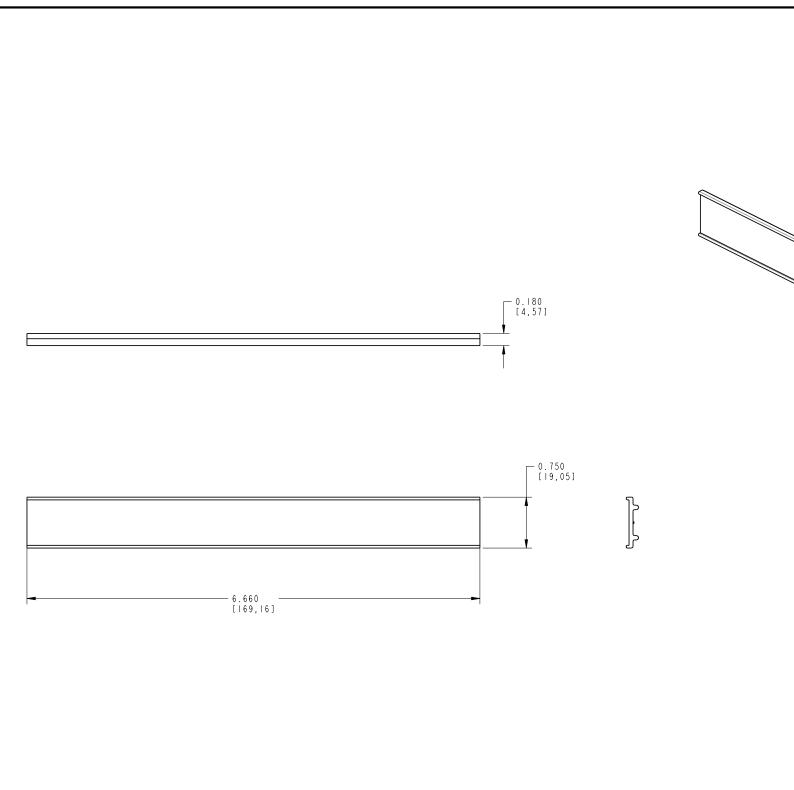
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NXXCBWG TYPE GIGABIX WIRE

**GUARD** NUMÉRO DE DESSIN/DRAWING NUMBER

BELDEN-101

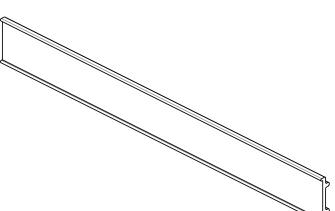


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AX101483	NXXCBDS	DESIGNATION STRIP	

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NUMÉRO DE DESSIN/DRAWING NUMBER

BELDEN-091

# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



#### AX101478 Connectivity Accessories - MANAGEMENT -D- RING

#### **Preview Document. Not Live Data.**





For more Information please call

1-800-Belden1

#### **Description**

MANAGEMENT -D- RING

#### Usage (Overall):

Suitable Applications	IBDN System 4800, 3600, 2400, Telecom Room	
Related Parts	GigaBIX Termination Kit	

#### **Physical Characteristics (Connectivity):**

#### **Dimensions:**

**Dimensions** 

Height (in.)	Width (in.)	Depth (in.)
6.000	6.850	1.210

#### Materials:

Materials

Description	Material
-D- Ring	Plastic - UL94V-0

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$\mathbf{v}$	v	٠.

Color

Black

#### Weight: Weight:

0.220 lbs.

# Packaging:

Packaging

Individually packaged in a clear plastic bag.

#### **Mechanical Characteristics (Connectivity):**

Storage Temperature Range	-40°C To +70°C	
Installation Temperature Range	-10°C To +60°C	

#### Applicable Specifications and Agency Compliance (Overall):

Applicable Standards &	<b>Environmental</b>	<b>Programs:</b>
------------------------	----------------------	------------------

ACA, Bi-national Standard Listed Safety Listing

#### Suitability:

Suitability - Indoor Yes - Indoor

#### Notes (Overall):

#### **Product Family:**

Revision Number: 0 Revision Date: 04-16-2013

# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



#### **AX101478 Connectivity Accessories - MANAGEMENT -D- RING**

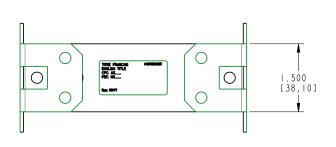
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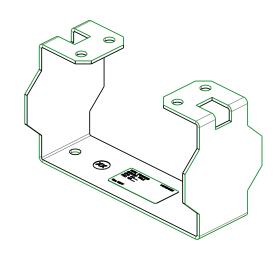
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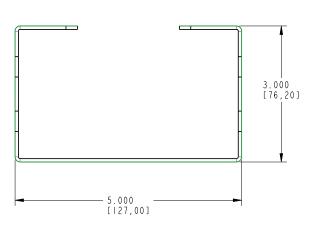
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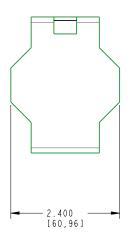
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INFORMATION SUR LE PRODUIT PRODUCT INFO		
NUMÉRO DE PIÈCE CODE DU PRODUIT PART NUMBER PRODUCT CODE DESCRIPTION		DESCRIPTION
AX102190	NXXCBMRA	GIGABIX MANAGEMENT RING SPACER

#### NOTES

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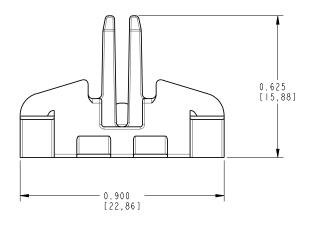
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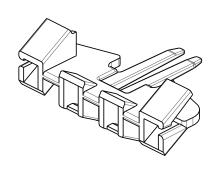
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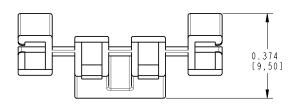
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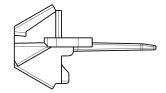
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BELDEN-096









INFORMATION SUR LE PRODUIT PRODUCT INFO			
NUMÉRO DE PIÈCE CODE DU PRODUIT PART NUMBER PRODUCT CODE DESCRIPTION			
AX101719	NXXCBTB	GIGABIX TERMINATION BAR	

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GIGABIX TERMINATION BAR

NUMÉRO DE DESSIN/DRAWING NUMBER

BELDEN-099



# **DATA**Sheet

# \_\_\_\_



AX102154 GigaBIX Color-Coded Clip

# GigaBIX Color-coded Clips

The GigaBIX Color-coded Clips are single-pair plastic clips that snap on the GigaBIX connectors to visually identify various services when using cross-connect wire. They are available in the 11 standard colors as the GigaFlex Modules which makes it very convenient for visual identification of voice and data ports at both ends of an horizontal run. The GigaBIX Color-coded Clips contribute to design flexibility and ease of administration in allowing various colors to be identified on the same GigaBIX connector.

#### **Features & Benefits**

- ➤ Available in 11 colors for easy network administration
- > Easy to clip over GigaBIX Connector pair-splitter
- > Can be stacked to adjacent pairs allowing for pair-to-pair color coding
- > Can be used to protect a special service from being disconnected
- Compatible with all GigaBIX and BIX connector

#### **Application**

> Color-coding for network management.

#### **Technical Specifications**

- Dimensions (H x W x D):8.9 mm x 4.2 mm x 6.1 mm(0.350 in. x 0.165 in. x 0.240 in.).
- Material: Plastic: gray, almond, white, black, orange, red, yellow, green, blue, purple, brown.

#### **Packaging**

- > 50 units packaged in a clear plastic bag
- Standard shipping carton of 5000 units (100 bags)

#### **For More Information**

For any other product information call: 1-800-BELDEN-1 or visit us at www.Belden.com

All information is subject to change without notice, since Belden reserves the right to change its products as progress in engineering and manufacturing methods or other circumstances may warrant.

#### **Ordering Information**

#### **GigaBIX Color-coded Clips**

# AX270172

DETAIL	UPC	ORDERING NUMBER
Gray	628575133925	AX102146
Almond	628575136278	AX102147
White	628575136285	AX102148
Black	628575136292	AX102149
Orange	628575136308	AX102150
Red	628575136315	AX102151
Yellow	628575136322	AX102152
Green	628575136339	AX102153
Blue	628575136346	AX102154
Purple	628575136353	AX102155
Brown	628575136360	AX102156





METRIC MEASUREMENT VERSION



#### AX104683 Faceplates and Panels - FiberExpress Ultra HD Patch Panel Housing 4U







For more Information please call

1-800-Belden1



### **General Description:**

FiberExpress Ultra HD Patch Panel Housing 4U, Empty, Titanium

#### **Image**

Image:



# Usage (Overall)

Suitable Applications:

FiberExpress Solutions, Backbone, Telecommunications Room, Main
Distribution Room, Data Centers

Related Parts: FiberExpress Ultra and Ultra High Density Frames and Cassettes

#### **Physical Characteristics (Connectivity)**

#### Capacity

#### **FXU HD Patch Panel Capacity:**

Туре	FX Ultra HD Frame/ Cassettes	FX Ultra HD LC Duplex / MPO Connectors	Frame/	FX Ultra LC Duplex / MPO Connectors
FiberExpress Ultra HD Patch Panel Housing 1U	4	72	4	48
FiberExpress Ultra HD Patch Panel Housing 2U	8	144	8	96
FiberExpress Ultra HD Patch Panel Housing 4U	16	288	16	192

#### Access

Front Connection: Static FXU HD / 1inch Pullout FXU

**Termination Area:** Front Sliding Drawer

#### **Dimensions**

#### **Dimensions:**

Height (mm)	Width (mm)	Depth (mm)
177.800	482.600	425.450

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#### METRIC MEASUREMENT VERSION



#### AX104683 Faceplates and Panels - FiberExpress Ultra HD Patch Panel Housing 4U

#### **Materials**

#### Materials:

Description	Material
Panel	Steel/Aluminum
Door	Aluminum

#### Color

Color: Titanium

Weight

Weight: 8.301 kg

**Included Parts** 

Included Parts: Screws (12-24); Screws (10-32); Screws (8-32); Tie Wraps; Kurly locks; Velcro

Straps; Identification Labels

**Packaging** 

Packaging: Individually packaged in a cardboard box.

**Mechanical Characteristics (Connectivity)** 

Storage Temperature Range: -40°C To +70°C

Operating Temperature Range: -10°C To +60°C

#### **Applicable Specifications and Agency Compliance (Overall)**

**Applicable Standards & Environmental Programs** 

EU Directive 2002/95/EC (RoHS): Yes

EU RoHS Compliance Date (mm/dd/yyyy): 02/23/2009

MII Order #39 (China RoHS): EUP 50

Suitability

Suitability - Indoor: Yes

#### **Transmission Characteristics (Connectivity)**

#### **Notes (Overall)**

Notes: For more information, please refer to our web site at http://www.belden.com. Installation Guide:PX105558.

#### **Product Family**

#### Part Numbers:

Description	Titanium Item Number	Black Item Number	Tool Item number
FiberExpress Ultra HD Patch Panel Housing 1U, Empty	AX104681	AX105563	-
FiberExpress Ultra HD Patch Panel Housing 2U, Empty	AX104682	AX105564	-
FiberExpress Ultra HD Patch Panel Housing 4U, Empty	AX104683	AX105565	-
FiberExpress Ultra HD Splice Housing Kit 1U, 144 Splices, Empty	AX104684	AX105678	-
FiberExpress Ultra HD 1U Standard Fixed Shelf, Empty	AX105164	AX105673	-
FiberExpress Ultra HD 1U Recessed Fixed Shelf, Empty	AX105165	AX105674	-
FiberExpress Ultra HD 4U Standard Fixed Shelf, Empty	AX105166	AX105675	-
FiberExpress Ultra HD 4U Recessed Fixed Shelf, Empty	AX105167	AX105676	-
FiberExpress Ultra HD Splice Housing Kit 1U, 72 Splices, Empty	AX105174	AX105677	-
FiberExpress Ultra HD Patch Cord Tray Cover	AX105162	AX105672	-
FiberExpress Ultra HD Release Tool	-	-	AX104685
FiberExpress Ultra HD Splice Accessory Kit	-	-	AX104705

#### **Related Documents**

Installation Guide:	http://www.belden.com/docs/upload/PX105678-EN_FX_Ultra_HD_Patch_Panel_Housing_4U-2U.pdf				
Product Bulletin:	http://www.belden.com/resourcecenter/documents/upload/PB500 FiberExpress Ultra HD System.pdf				
AutoCAD Drawing:	http://www.belden.com/pdfs/BIMModels/Belden-394.zip				

PDF Drawing: <a href="http://www.belden.com/docs/upload/Belden-394.pdf">http://www.belden.com/docs/upload/Belden-394.pdf</a>

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#### METRIC MEASUREMENT VERSION



#### AX104683 Faceplates and Panels - FiberExpress Ultra HD Patch Panel Housing 4U

#### **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
AX104683	1 EA	0.000 KG			FX UHD 4U PATCH PANEL HOUSING
AX104683+CN	1 EA	0.000 KG			FX UHD 4U PATCH PANEL HOUSING

Revision Number: 0 Revision Date: 12-16-2013

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**METRIC MEASUREMENT VERSION** 



#### AX104682 Faceplates and Panels - FiberExpress Ultra HD Patch Panel Housing 2U







For more Information please call

1-800-Belden1



#### **General Description:**

FiberExpress Ultra HD Patch Panel Housing 2U, Empty, Titanium

#### Image

Image:



#### Usage (Overall)

Suitable Applications:	FiberExpress Solutions, Backbone, Telecommunications Room, Main Distribution Room, Data Centers
Related Parts:	FiberExpress Ultra and Ultra High Density Frames and Cassettes

#### **Physical Characteristics (Connectivity)**

#### Capacity

FXU HD Patch Panel Capacity:

Туре	Frame/	FX UHD LC Duplex / MPO Connectors		FX Ultra LC Duplex / MPO Connectors
FX UHD 0U Bracket - Single Holder	1	18	1	12
FX UHD Patch Panel Housing 4U	16	288	16	192
FX UHD 0U Bracket - Double Holder	2	36	2	24
FX UHD Patch Panel Housing 1U	4	72	4	48
FX UHD Patch Panel Housing 2U	8	144	8	96

#### Access

Front Connection: 1inch Pullout FXU / Static FXU HD

Termination Area: Front Sliding Drawer

#### Dimensions

Dimensions:

Height (mm)	Width (mm)	Depth (mm)
88.900	482.600	425.450

#### Materials

Materials:

Description	Material
Panel	Steel/Aluminum
Door	Aluminum

#### Color

Color: Titanium

Weight

**Weight:** 4.600 kg

**Included Parts** 

Page 1 of 2 07-11-2017

#### **METRIC MEASUREMENT VERSION**



#### AX104682 Faceplates and Panels - FiberExpress Ultra HD Patch Panel Housing 2U

Included Parts: Screws (12-24); Screws (10-32); Screws (8-32); Tie Wraps; Kurly locks; Velcro Straps; Identification Labels **Packaging** 

Packaging: Individually packaged in a cardboard box.

**Mechanical Characteristics (Connectivity)** 

-40°C To +70°C Storage Temperature Range: -10°C To +60°C Operating Temperature Range:

#### Applicable Specifications and Agency Compliance (Overall)

#### **Applicable Standards & Environmental Programs**

EU Directive 2002/95/EC (RoHS): Yes EU RoHS Compliance Date (mm/dd/yyyy): 02/23/2009 EUP 50 MII Order #39 (China RoHS): Suitability

#### Transmission Characteristics (Connectivity)

#### Notes (Overall)

Suitability - Indoor:

Notes: For more information, please refer to our web site at http://www.belden.com. Installation Guide:PX105560.

Yes

#### **Product Family**

#### Part Numbers:

Description	Titanium Item Number	Black Item Number	Tool Item number
FX UHD Patch Panel Housing 1U, Empty	AX104681	AX105563	-
FX UHD Patch Panel Housing 2U, Empty	AX104682	AX105564	-
FX UHD Patch Panel Housing 4U, Empty	AX104683	AX105565	-
FX UHD Splice Housing Kit 1U, 144 Splices, Empty	AX104684	AX105678	-
FX UHD 1U Standard Fixed Shelf, Empty	AX105164	AX105673	-
FX UHD 1U Recessed Fixed Shelf, Empty	AX105165	AX105674	-
FX UHD 4U Standard Fixed Shelf, Empty	AX105166	AX105675	-
FX UHD 1U Standard Trayless Shelf, Empty	AX105811	AX105810	-
FX UHD 4U Recessed Fixed Shelf, Empty	AX105167	AX105676	-
FX UHD 1U Frame, Empty	AX105813	AX105812	-
FX UHD Splice Housing Kit 1U, 72 Splices, Empty	AX105174	AX105677	-
FX UHD Patch Cord Tray Cover	AX105162	AX105672	-
FX UHD Release Tool	-	-	AX104685
FX UHD Splice Accessory Kit	-	-	AX104705
FX UHD Patch Panel Housing Fixed 1U	AX107275	-	-
FX UHD Patch Panel Housing Fixed 2U	AX107276	AX107286	-
FX UHD Patch Panel Fix Short 2U	AX107418	AX107417	

#### **Related Documents**

Installation Guide:	http://www.belden.com/docs/upload/PX105678-EN_FX_Ultra_HD_Patch_Panel_Housing_4U-2U.pdf
Product Bulletin:	http://www.belden.com/resourcecenter/documents/upload/PB500 FiberExpress Ultra HD System.pdf
AutoCAD Drawing:	http://www.belden.com/pdfs/BIMModels/Belden-393.zip
PDF Drawing:	http://www.belden.com/docs/upload/Belden-393.pdf

#### **Put Ups and Colors:**

Item #		Putup	Ship Weight	Color	Notes	Item Desc
AX1046	82	1 EA	5.000 KG			FX UHD 2U PATCH PANEL HOUSING

Revision Number: 0 Revision Date: 12-16-2013

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METRIC MEASUREMENT VERSION



#### AX104681 Faceplates and Panels - FiberExpress Ultra HD Patch Panel Housing 1U







For more Information please call

1-800-Belden1



#### **General Description:**

FiberExpress Ultra HD Patch Panel Housing 1U, Empty, Titanium

#### **Image**

Image:



#### **Usage (Overall)**

**Suitable Applications:** FiberExpress Solutions, Backbone, Telecommunications Room, Main

Distribution Room, Data Centers

Related Parts: FiberExpress Ultra and Ultra High Density Frames and Cassettes

#### **Physical Characteristics (Connectivity)**

#### Capacity

#### **FXU HD Patch Panel Capacity:**

Туре	FX Ultra HD Frame/ Cassettes	FX Ultra HD LC Duplex / MPO Connectors		FX Ultra LC Duplex / MPO Connectors
FiberExpress Ultra HD Patch Panel Housing 1U	4	72	4	48
FiberExpress Ultra HD Patch Panel Housing 2U	8	144	8	96
FiberExpress Ultra HD Patch Panel Housing 4U	16	288	16	192

#### Access

Front Connection: Static FXU HD / 1inch Pullout FXU

Termination Area: Front Sliding Drawer

#### **Dimensions**

#### Dimensions:

Height (mm)	Width (mm)	Depth (mm)
44.450	482.600	425.450

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#### **METRIC MEASUREMENT VERSION**



#### AX104681 Faceplates and Panels - FiberExpress Ultra HD Patch Panel Housing 1U

#### **Materials**

#### Materials:

Description	Material
Panel	Steel/Aluminum
Door	Aluminum

#### Color

Color: Titanium

Weight

**Weight:** 2.540 kg

**Included Parts** 

Included Parts: Screws (12-24); Screws (10-32); Screws (8-32); Tie Wraps; Kurly locks; Velcro

Straps; Identification Labels

**Packaging** 

Packaging: Individually packaged in a cardboard box.

**Mechanical Characteristics (Connectivity)** 

Storage Temperature Range: -40°C To +70°C

Operating Temperature Range: -10°C To +60°C

#### **Applicable Specifications and Agency Compliance (Overall)**

**Applicable Standards & Environmental Programs** 

EU Directive 2002/95/EC (RoHS): Yes

EU RoHS Compliance Date (mm/dd/yyyy): 02/23/2009

MII Order #39 (China RoHS): EUP 50

Suitability

Suitability - Indoor: Yes

#### **Transmission Characteristics (Connectivity)**

#### **Notes (Overall)**

Notes: For more information, please refer to our web site at http://www.belden.com. Installation Guide: PX105539.

#### **Product Family**

#### Part Numbers:

Description	Item Number
FiberExpress Ultra HD Patch Panel Housing 1U, Empty, Titanium	AX104681
FiberExpress Ultra HD Patch Panel Housing 2U, Empty, Titanium	AX104682
FiberExpress Ultra HD Patch Panel Housing 4U, Empty, Titanium	AX104683
FiberExpress Ultra HD Splice Housing Kit 1U, 144 splice, Titanium	AX104684

#### **Related Documents**

Installation Guide:	http://www.belden.com/docs/upload/PX105677-EN_FX_Ultra_HD_Patch_Panel_Housing_1U.pdf	
Product Bulletin:	http://www.belden.com/resourcecenter/documents/upload/PB500_FiberExpress_Ultra_HD_System.pdf	
AutoCAD Drawing:	http://www.belden.com/pdfs/BIMModels/Belden-392.zip	
PDF Drawing:	http://www.belden.com/docs/upload/Belden-392.pdf	

#### **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
AX104681	1 EA	4.660 KG			FX UHD 1U PATCH PANEL HOUSING

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#### METRIC MEASUREMENT VERSION



#### AX104681 Faceplates and Panels - FiberExpress Ultra HD Patch Panel Housing 1U

Revision Number: 0 Revision Date: 03-30-2012

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#### FC5H12LDFS Faceplates and Panels - FX UHD SPLICING CASSETTE

#### **Preview Document. Not Live Data.**



For more Information please call

1-800-Belden1



#### **Description**

FX UHD CASSETTE, OM5, 12 PORTS, SPLICING, LC DUPLEX, LIME GREEN ADAPTERS

#### Usage (Overall):

Suitable Applications	FiberExpress Solutions, Backbone, Telecommunications Room, Main Distribution Roor Data Centers
Related Parts	FX UHD & FXU Patch Panels, FX Pigtails, FX Brilliance

#### **Physical Characteristics (Connectivity):**

Capacity:

Max. Capacity 24 Fibers, 12 LC Duplex Ports

Access:

Front Connection Static FXU HD

**Dimensions:** 

Dimensions

Height (in.)	Width (in.)	Length (in.)
1.500	4.500	9.080

#### Materials:

Materials

Description	Туре	Material	Color
Adapter Sleeve		Zirconia-Ceramic	
Front Connector Body	LC-Duplex	Plastic - UL94V-0	Lime Green
Cassette assy		Plastic - UL94V-0	Black

Weight:

Weight: 0.500 lbs.

Packaging:

Packaging Individually packaged in a plastic shell, Shipped in cardboard box (14/box)

**Mechanical Characteristics (Connectivity):** 

Storage Temperature Range -10°C To +75°C

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ENGLISH MEASUREMENT VERSION



#### FC5H12LDFS Faceplates and Panels - FX UHD SPLICING CASSETTE

Operating Temperature Range -10°C To +60°C

#### Applicable Specifications and Agency Compliance (Overall):

#### Applicable Standards & Environmental Programs:

EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	07/01/2006
MII Order #39 (China RoHS)	EUP 50
Suitability: Suitability - Indoor	Yes

#### Transmission Characteristics (Connectivity):

#### Notes (Overall):

Notes

Splice holders are included (total of 24 splices). 3 variants of splice holders are supplied with the splice cassette, they can accommodate for the 900-900μm, the 900-250μm, the 250-250μm, and the 12F RIBBON splice protectors. Pigtails are not included they need to be ordered separately.

For additional information about this product, please contact our Technical Support group (ibdn.ts@belden.com) or your local sales

representative.

#### **Product Family:**

Revision Date: 12-17-2019 Revision Number: 0

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ENGLISH MEASUREMENT VERSION



#### AX105700 Accessories - FXUHD Management Spool



For more Information please call

1-800-Belden1



#### **Description**

Fiber Express Ultra High Density Management Spool

#### Usage (Overall):

FiberExpress Ultra HD Solutions, Backbone, Telecommunications Room, Main Suitable Applications Distribution Room, Data Centers

#### Applicable Specifications and Agency Compliance (Overall):

#### Applicable Standards & Environmental Programs:

EU Directive 2011/65/EU (ROHS II)	Yes
EU Directive 2002/95/EC (RoHS)	Yes

#### Notes (Overall):

-Compatible with: AX104681, AX104682 and AX104683. -Suitable for 900um fibers. -Recommended length for 900um fiber Notes management inside splice spools: 1.02m (40'). -Magnetic latching mechanism. -Splice Spool quantities: up to 8.

Revision Date: 04-23-2014 Revision Number: 0

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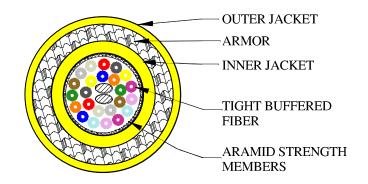
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# SPECIFICATION 24 OS2 FIBER DISTRIBUTION PLENUM INDOOR/OUTDOOR ARMORED CABLE

Part Number:

# FDSD024A9Y



#### **CONSTRUCTION**

FIBER: TYPE: OS2: LOW WATER PEAK SINGLE MODE

**BUFFER:** TYPE: TIGHT BUFFER

MATERIAL: PLENUM RATED THERMOPLASTIC

DIAMETER:  $900 \pm 50 \mu m$ 

**ASSEMBLY:** 24 INDIVIDUALLY COLOR CODED TIGHT

**BUFFERED FIBERS OSCILLATED TOGETHER** 

**STRENGTH** 

MEMBERS: WATER SWELLABLE ARAMID YARN

INNER JACKET: MATERIAL: PLENUM RATED THERMOPLASTIC

NOMINAL WALL: .030" (.76 mm) NOMINAL DIAMETER: .330" (8.38 mm)

**COLOR: YELLOW** 

ARMOR: INTERLOCKING ALUMINUM

NOMINAL DIAMETER: .575" (14.60 mm)

**OUTER JACKET: MATERIAL: PLENUM RATED THERMOPLASTIC** 

NOMINAL WALL: .028" (.71 mm) NOMINAL DIAMETER: .631" (16.03 mm)

**COLOR: YELLOW** 

LISTINGS: UL TYPE OFCP - cUL OFC FT6

#### **OS2 OPTICAL SPECIFICATIONS**

WAVELENGTH	ATTENUATION
nm	dB/km
1310	.80 Max
1383	.80 Max
1550	.50 Max

The above optical specifications meet or exceed the requirements of TIA-568-C.3 (ISO 11801 OS2), Gigabit Ethernet and ATM applications. Fiber conforms to ITU G.652.d.

#### **FIBER COLOR CODE**

FIBER#	COLOR	FIBER#	COLOR/HASH
1	BLUE	13	BLUE/BLK
2	ORANGE	14	ORANGE/BLK
3	GREEN	15	GREEN/BLK
4	BROWN	16	BROWN/BLK
5	GRAY	17	GRAY/BLK
6	WHITE	18	WHITE/BLK
7	RED	19	RED/BLK
8	BLACK	20	BLACK/WHT
9	YELLOW	21	YELLOW/BLK
10	VIOLET	22	VIOLET/BLK
11	PINK	23	PINK/BLK
12	AQUA	24	AQUA/BLK





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Rev	Description	Date	Init.

 Date: 01/08/15
 Page 1 of 2
 Part Number:

 Orig: WSJ
 Review:
 FDSD024A9\

# SPECIFICATION 24 OS2 FIBER DISTRIBUTION PLENUM INDOOR/OUTDOOR ARMORED CABLE

Part Number:

FDSD024A9Y

#### **MECHANICAL & ENVIRONMENTAL**

Crush Resistance: FOTP-41 220 N/cm FOTP-25 Impact Resistance: 2000 Impacts w/3 Nem FOTP-104 Flexure: 2000 Cycles min. Min. Bend Radius long term: FOTP-33 15x Cable diameter Min. Bend Radius short term: FOTP-33 20x Cable diameter Short Term loading: FOTP-33 600 lbs (2700N) FOTP-3 -40 °C to +70 °C Operating Temp.: Storage Temp.: FOTP-3 -40 °C to +80 °C

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Rev	Description	Date	Init.
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 Date: 01/08/15
 Page 2 of 2
 Part Number:

Orig: WSJ Review: FDSD024A9Y

# SPECIFICATION 12 OS2 FIBER DISTRIBUTION PLENUM INDOOR/OUTDOOR ARMORED CABLE

Part Number: FDSD012A9Y

BLUE, ORANGE, GREEN, BROWN, SLATE,

ATTENUATION dB/km

.80 Max

.50 Max

WHITE, RED, BLACK, YELLOW, VIOLET, PINK, AQUA

WAVELENGTH

1310

1383

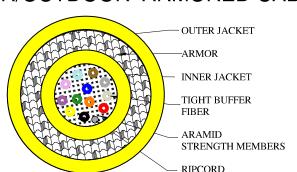
1550

**OS2 OPTICAL SPECIFICATIONS** 

The above optical specifications meet or exceed the requirements of

TIA-568-C 3 (ISO 11801 OS2), Gigabit Ethernet and ATM applications.

Fiber conforms to ITU G.652.d.



COLOR CODE:

#### CONSTRUCTION

FIBER: TYPE: OS2 LOW WATER PEAK SINGLE-MODE LISTINGS: UL/cUL TYPE OFCP

**BUFFER:** TYPE: TIGHT BUFFER

MATERIAL: PLENUM RATED

THERMOPLASTIC DIAMETER:  $900 \pm 50 \ \mu m$ 

ASSEMBLY: 12 INDIVIDUALLY COLOR CODED TIGHT

BUFFERED FIBERS WITH STRENGTH

**MEMBERS** 

STRENGTH MEMBERS: WATER SWELLABLE ARAMID YARN

**INNER JACKET:** MATERIAL: PLENUM RATED THERMOPLASTIC

NOMINAL WALL: .025" (.64 mm) NOMINAL DIAMETER: .225" (5.72 mm)

COLOR: ERIKA VIOLET

ARMOR: INTERLOCKING ALUMINUM

NOMINAL DIAMETER: .450" (11.43 mm)

OUTER JACKET: MATERIAL: PLENUM RATED THERMOPLASTIC

NOMINAL WALL: .028" (.71 mm) NOMINAL DIAMETER: .506" (12.85 mm)

COLOR: ERIKA VIOLET

### **MECHANICAL & ENVIRONMENTAL**

Crush Resistance: FOTP-41 220 N/cm Impact Resistance: FOTP-25 2000 Impacts w/3 Nem Flexure: FOTP-104 2000 Cycles min. Min. Bend Radius long term: FOTP-33 15x Cable diameter Min. Bend Radius short term: FOTP-33 20x Cable diameter FOTP-33 Short Term loading: 300 lbs (1334N) Operating Temp.: FOTP-3 -40°C to +70°C Storage Temp : FOTP-3 -40 °C to +80 °C

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Orig: WSJ



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<u>nev</u>	Description			Date	IIIII.
		_	•		
Date	: 01/07/15	Page 1 of 1		Part Num	ber:

Review:





Product: FISD024A9 3

Indoor Plenum OS2 Distribution Tight Buffer 24 Fibers

#### **Product Description**

FX Indoor OS2 Distribution Tight Buffer 24 Fibers OFCP Aluminum Interlocked Armor Non-Unitized Yellow Jacket

#### **Technical Specifications**

Part Number:	FISD024A9
Construction Type:	Distribution

#### **Product Overview**

Print Legend:	BELDEN 24xOS2 INDOOR DISTRIBUTION CABLE FISD024A9 E95466(-PLANT ID) (UL) TYPE OFCP C(UL) OFCP FT6 ROHS (LOT NUMBER) (MMYYYY DATE CODE) (SEQUENTIAL MATERIAL)
Environmental Space:	Indoor
Suitable Applications:	Indoor

#### Construction

#### Fiber Cable Construction

Fiber Type	Fiber Count		
OS2	24		

Fiber Color Coding: Blue, Orange, Green, Brown, Gray, White, Red, Black, Yellow, Violet, Pink, Aqua

#### Buffer Specification

Buffer Material	Buffer Diameter
Thermoplastic	900 µm

#### **SubUnit Specifications**

Fibers Per Subunit: 24

#### **Jacket Specifications**

Number of Jackets:	Double Jacket
Type of Armor:	Interlocked Aluminum
Number of Inner Jacket Ripcords:	1
Color@InnerJacket1:	Yellow
Nominal Diameter@InnerJacket1:	0.33 in
Material@InnerJacket1:	PVC

#### Outer Jacket Material

Material	Nominal Diameter	
PVC (	0.66 in (16.8 mm)	
Outer Jack	et Color:	
Number of Ripcords:	Number of Outer Jacket	

#### **Optical Characteristics**

Mode Field Diameter:	9.2		

Fiber Core Diameter:	8.2/125µm
Max Attenuation at 1310 nm:	0.5 dB/km
Max Attenuation at 1550 nm:	0.5 dB/km
Wavelength:	1310 nm / 1550 nm
10 Gigabit Ethernet Performance:	10,000 m / 40,000 m
1 Gigabit Ethernet Performance:	5,000 m / -

#### **Mechanical Characteristics**

#### Mechanical Tests

Description	Requirement/Value
Cable Min. Bend Radius Installation (Short Term)	20x Cable OD
Cable Min. Bend Radius Operation (Long Term)	10x Cable OD
Cable Max. Tensile Strength Installation (Short Term)	67 N (300 lbf)
Cable Max. Tensile Strength Operation (Long Term)	20 N (90 lbf)

#### **Temperature Range**

Operating Temp Range:	0C to +70C
Installation Temp Range:	0C to +60C
Storage Temp Range:	-40C to +70C

#### **Standards**

UL Rating/Flame Test:	Plenum
CEC/C(UL) Specification:	OFNP
Telecommunications Standards:	ANSI/ICEA S-83-596
RoHS:	Yes

#### **History**

#### Variants

Item #	Color	UPC	
ISD024A9	Yellow	61282536	8182
Jpdate and R	evision:		Revi

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Product: FISD012A9 3

Indoor Plenum OS2 Distribution Tight Buffer 12 Fibers

## **Product Description**

FX Indoor OS2 Distribution Tight Buffer 12 Fibers OFCP Aluminum Interlocked Armor Non-Unitized Yellow Jacket

## **Technical Specifications**

Part Number:	FISD012A9
Construction Type:	Distribution

#### **Product Overview**

Print Legend:	BELDEN 12xOS2 INDOOR DISTRIBUTION CABLE FISD012A9 E95466(-PLANT ID) (UL) TYPE OFCP C(UL) OFCP FT6 ROHS (LOT NUMBER) (MMYYYY DATE CODE) (SEQUENTIAL MATERIAL)
Environmental Space:	Indoor
Suitable Applications:	Indoor

#### Construction

#### Fiber Cable Construction

Fiber Type	Fiber Count
OS2	12

Fiber Color Coding: Blue, Orange, Green, Brown, Gray, White, Red, Black, Yellow, Violet, Pink, Aqua

## **Buffer Specification**

Buffer Material	Buffer Diameter
Thermoplastic	900 µm

Central Strength Member: Upjacketed GRP

## **SubUnit Specifications**

Fibers Per Subunit: 12

## **Jacket Specifications**

Number of Jackets:	Double Jacket
Type of Armor:	Interlocked Aluminum
Number of Inner Jacket Ripcords:	1
Color@InnerJacket1:	Yellow
Nominal Diameter@InnerJacket1:	0.23 in
Material@InnerJacket1:	PVC

#### Outer Jacket Material

Material	Nominal Diameter	
PVC	0.51 in (13 mm)	
Outer Jac	cket Color:	
Number o	Number of Outer Jacket Ripcords:	

#### **Optical Characteristics**

Mode Field Diameter:	9.2
Fiber Core Diameter:	8.2/125µm
Max Attenuation at 1310 nm:	0.5 dB/km
Max Attenuation at 1550 nm:	0.5 dB/km
Wavelength:	1310 nm / 1550 nm
10 Gigabit Ethernet Performance:	10,000 m / 40,000 m
1 Gigabit Ethernet Performance:	5,000 m / -

#### **Mechanical Characteristics**

#### Mechanical Tests

Description	Requirement/Value
Cable Min. Bend Radius Installation (Short Term)	20x Cable OD
Cable Min. Bend Radius Operation (Long Term)	10x Cable OD
Cable Max. Tensile Strength Installation (Short Term)	67 N (300 lbf)
Cable Max. Tensile Strength Operation (Long Term)	20 N (90 lbf)

#### **Temperature Range**

Operating Temp Range:	0C to +70C
Installation Temp Range:	OC to +60C
Storage Temp Range:	-40C to +70C

#### **Standards**

UL Rating/Flame Test:	Plenum
CEC/C(UL) Specification:	OFNP
Telecommunications Standards:	ANSI/ICEA S-83-596
RoHS:	Yes

#### **History**

#### Variants

FISD012A9 Yellow 61282	68526
Update and Revision:	Revision Number: 0.67 Revision Date: 07-11-2019

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Item # Color UPC

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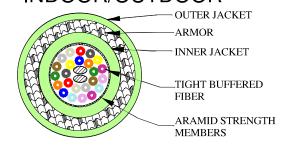
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## **SPECIFICATION**

24 OM5 DISTRIBUTION INTERLOCK ARMOR PLENUM INDOOR/OUTDOOR

# Part Number: FD5D024A9L



#### CONSTRUCTION

FIBER: TYPE: OM5: 50/125 μm MULTIMODE

**BUFFER:** TYPE: TIGHT BUFFER

MATERIAL: PLENUM RATED THERMOPLASTIC

DIAMETER:  $900 \pm 50 \mu m$ 

ASSEMBLY: 24 INDIVIDUALLY COLOR CODED TIGHT

**BUFFERED FIBERS OSCILLATED TOGETHER** 

**STRENGTH** 

MEMBERS: WATER SWELLABLE ARAMID YARN

INNER JACKET: MATERIAL: PLENUM RATED THERMOPLASTIC

NOMINAL WALL: .030" (.76 mm) NOMINAL DIAMETER: .330" (8.38 mm)

COLOR: LIME

ARMOR: INTERLOCKING ALUMINUM

NOMINAL DIAMETER: .575" (14.60 mm)

**OUTER JACKET: MATERIAL: PLENUM RATED THERMOPLASTIC** 

NOMINAL WALL: .028" (.71 mm)

NOMINAL DIAMETER: .631" (16.03 mm)

COLOR: LIME

LISTINGS: UL TYPE OFCP - cUL OFCP - FT6

## **OM5 OPTICAL SPECIFICATIONS**

	WAVELENGTH	ATTENUATION	OFL   EMB BANDWIDTH	
	nm	dB/km	MHz	-km
ſ	850	3.0 Max	3500 Min	4700 Min
ſ	953	2.5 Max	1850 Min	2470 Min
	1300	1.0 Max	500 Min	500 Min

Laser-based sources: Performance is guaranteed to achieve 440 meters for 40 Gigabit SWDM and 150 Meters for 100Gigabit SWDM

#### Ethernet (IEEE 802.3ae) standard-compliant links.

The above optical specifications meet or exceed the requirements of TIA-568-3-D (ISO 11801 OM5), Gigabit Ethernet and ATM applications

#### FIBER COLOR CODE

FIBER#	COLOR	FIBER#	COLOR/HASH
1	BLUE	13	BLUE/BLK
2	ORANGE	14	ORANGE/BLK
3	GREEN	15	GREEN/BLK
4	BROWN	16	BROWN/BLK
5	GRAY	17	GRAY/BLK
6	WHITE	18	WHITE/BLK
7	RED	19	RED/BLK
8	BLACK	20	BLACK/WHT
9	YELLOW	21	YELLOW/BLK
10	VIOLET	22	VIOLET/BLK
11	PINK	23	PINK/BLK
12	AQUA	24	AQUA/BLK

## **MECHANICAL & ENVIRONMENTAL**

Crush Resistance: FOTP-41 250 N/cm Impact Resistance: FOTP-25 2000 Impacts w/3 Nem Flexure: FOTP-104 2000 Cycles min. Min. Bend Radius long term: FOTP-33 15x Cable diameter Min. Bend Radius short term: FOTP-33 20x Cable diameter Short Term loading: FOTP-33 600 lbs (2700N) Operating Temp: FOTP-3 -40°C to +70°C Storage Temp FOTP-3 -40°C to +70°C Installation Temp.: FOTP-3 -20°C to +70°C

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Rev	Description	Date	Init.

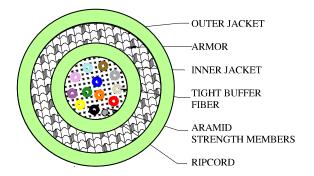
 Date: 01/28/19
 Page 1 of 1
 Part Number:

 Orig: WSJ
 Review:
 FD5D024A9L

## **SPECIFICATION** 12 OM5 FIBER DISTRIBUTION PLENUM INDOOR/OUTDOOR ARMORED CABLE

Part Number:

FD5D012A9L



LISTINGS:

COLOR CODE:

#### CONSTRUCTION

FIBER: TYPE: OM5 50/125 um MULTIMODE

**BUFFER:** TYPE: TIGHT BUFFER

MATERIAL: PLENUM RATED

**THERMOPLASTIC** DIAMETER:  $900 \pm 50 \mu m$ 

ASSEMBLY: 12 INDIVIDUALLY COLOR CODED TIGHT

**BUFFERED FIBERS WITH STRENGTH** 

**MEMBERS** 

STRENGTH MEMBERS: WATER SWELLABLE ARAMID YARN

**INNER JACKET:** MATERIAL: PLENUM RATED THERMOPLASTIC

> NOMINAL WALL: .025" (.64 mm) NOMINAL DIAMETER: .225" (5.72 mm)

COLOR: LIME

ARMOR: INTERLOCKING ALUMINUM

NOMINAL DIAMETER: .450" (11.43 mm)

**OUTER JACKET:** MATERIAL: PLENUM RATED THERMOPLASTIC

NOMINAL WALL: .028" (.71 mm) NOMINAL DIAMETER: 506" (12.85 mm)

**COLOR: LIME** 

#### OME ODTICAL SPECIFICATIONS

BLUE, ORANGE, GREEN, BROWN, SLATE,

UL/cUL TYPE OFCP

WHITE, RED, BLACK, YELLOW, VIOLET, PINK, AQUA

ONIS OPTICAL SPECIFICATIONS			
WAVELENGTH	ATTENUATION	ATTENUATION OFL   EMB	
		BAND	VIDTH
nm	dB/km	MHz	-km
850	3.0 Max	3500 Min	4700 Min
953	2.5 Max	1850 Min	2470 Min
1300	1.0 Max	500 Min	500 Min

Laser-based sources: Performance is guaranteed to achieve 440 meters for 40 Gigabit SWDM and 150 Meters for 100Gigabit SWDM

## Ethernet (IEEE 802.3ae) standard-compliant links.

The above optical specifications meet or exceed the requirements of TIA-568-3-D (ISO 11801 OM5), Gigabit Ethernet and ATM applications.

#### **MECHANICAL & ENVIRONMENTAL**

Crush Resistance: FOTP-41 220 N/cm FOTP-25 Impact Resistance: 2000 Impacts w/3 Nem Flexure: FOTP-104 2000 Cycles min. Min. Bend Radius long term: FOTP-33 15x Cable diameter Min. Bend Radius short term: FOTP-33 20x Cable diameter Short Term loading: FOTP-33 300 lbs (1334N) Operating Temp.: FOTP-3 -40°C to +70°C Storage Temp : FOTP-3 -40°C to +90°C

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Rev	Description		Date	Init.
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Date	: 01/28/19	Page 1 of 1	Part Num	ber:
Orig:	WSJ	Review:	FD5D01	2A9L

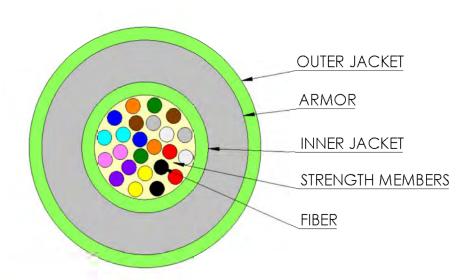


## **Part Number:**

FI5D024A9

## **Description:**

FX INDOOR, OM5, DISTRIBUTION TIGHT BUFFER, 24 FIBERS, OFCP ALUMINUM INTERLOCKED ARMOR, NON-UNITIZED, LIME GREEN JACKET



## **Fiber Specifications**

Fiber Type:	OM5 50/125 um MULTIMODE	
Buffer Diameter:	900μm	
Buffer Material	PVC Thermoplastic	
Fiber Count:	24	
Fiber Color Coding:	Per TIA/EIA 598	

## **Inner Jacket Specifications**

Material:	Plenum Rated Thermoplastic
Nominal Diameter:	0.330" (8.4 mm)
Jacket Color:	Lime Green
Strength Members:	Aramid Yarns
Number of Ripcords:	1

## **Armor Specifications**

- 1		I I I I AI I
- 1	Material:	Interlocking Aluminum
- 1	TVI de l'Idi.	The Free King / Karimian

## **Outer Jacket Specifications**

Material:	Plenum Rated Thermoplastic
Nominal Diameter:	0.580" (14.7 mm)
Jacket Color:	Lime Green

## **Optical Characteristics**

Wavelength:	850 nm	1300 nm
Max Attenuation:	3.0 dB/km	1.0 dB/km
10 Gigabit Ethernet Performance:	550 m	1100 m
Effective Modal Bandwidth (EMB):	4700 MHz-km Min	500 MHz-km Min
Min Overfilled Launch (OFL) Bandwidth:	3500 MHz-km Min	500 MHz-km Min

## **Mechanical Characteristics**

Min Bend Radius During Installation:	20 x cable OD
Min Bend Radius During Operation:	15 x cable OD
Max Tensile Strength During Installation:	300 lbf (1330 N)

Max Tensile Strength During Operation:	90 lbf (400 N)
Crush Resistance:	440 N/cm

## **Temperature Range**

Operating:	0°C to +70°C
Installation:	0°C to +60°C
Storage:	-40°C to +70°C

## **Standards**

Flame Rating:	UL TYPE OFCP - cUL OFCP FT6
Telecommunications Standards:	ICEA S-83-596
RoHS:	Compliant

## **History**

Revision	Engineer	Date	Description
0	JJZ	1/27/2020	TD Created

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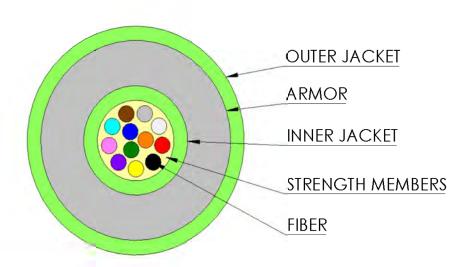


## **Part Number:**

FI5D012A9

## **Description:**

FX INDOOR, OM5, DISTRIBUTION TIGHT BUFFER, 12 FIBERS, OFCP ALUMINUM INTERLOCKED ARMOR, NON-UNITIZED, LIME GREEN JACKET



## **Fiber Specifications**

Fiber Type:	OM5 50/125 um MULTIMODE	
Buffer Diameter:	900µm	
Buffer Material	PVC Thermoplastic	
Fiber Count:	12	
Fiber Color Coding:	Per TIA/EIA 598	

## **Inner Jacket Specifications**

Material:	Plenum Rated Thermoplastic
Nominal Diameter:	0.260" (6.6 mm)
Jacket Color:	Lime Green
Strength Members:	Aramid Yarns
Number of Ripcords:	1

## **Armor Specifications**

		/
N A - 4 1	La Baralla alita a Albarationara	
Material:	Interlocking Aluminum	
···atorian	The street and the st	

## **Outer Jacket Specifications**

Material:	Plenum Rated Thermoplastic
Nominal Diameter:	0.530" (13.5mm)
Jacket Color:	Lime Green

## **Optical Characteristics**

Wavelength:	850 nm	1300 nm
Max Attenuation:	3.0 dB/km	1.0 dB/km
10 Gigabit Ethernet Performance:	550 m	1100 m
Effective Modal Bandwidth (EMB):	4700 MHz-km Min	500 MHz-km Min
Min Overfilled Launch (OFL) Bandwidth:	3500 MHz-km Min	500 MHz-km Min

## **Mechanical Characteristics**

Min Bend Radius During Installation:	20 x cable OD
Min Bend Radius During Operation:	15 x cable OD
Max Tensile Strength During Installation:	300 lbf (1330 N)

Max Tensile Strength During Operation:	90 lbf (400 N)
Crush Resistance:	440 N/cm

## **Temperature Range**

Operating:	0°C to +70°C
Installation:	0°C to +60°C
Storage:	-40°C to +70°C

## **Standards**

Flame Rating:	UL TYPE OFCP - cUL OFCP FT6
Telecommunications Standards:	ICEA S-83-596
RoHS:	Compliant

## **History**

Revision	Engineer	Date	Description
0	JJZ	1/20/2020	TD Created

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**ENGLISH MEASUREMENT VERSION** 



## C6011xx000A06 Cable Assemblies - 3600 Pre-Terminated Cable Assembly

#### **Preview Document. Not Live Data.**



For more Information please call

1-800-Belden1



## Description

3600 Pre-Terminated Cable Assembly, Bonded-Pair, 4-Pair, 23 AWG Solid, T568A/B-T568A/B, 6 Cables, CMR.

## Usage (Overall):

Suitable Applications	IBDN System 3600, TIA Category 6
Related Parts	CAT6+ RJ45 Couplers, CAT6+ Coupler Patch Panels

#### **Multi Conductor:**

## **Physical Characteristics:**

#### Conductor:

**AWG** 

# Pairs	AWG	Stranding	Conductor Material
4	23	Solid	BC - Bare Copper

#### Insulation:

Insulation Material



## **Outer Jacket:**

**Outer Jacket Material** 

## Outer Jacket Material PVC - Polyvinyl Chloride

## **Overall Cabling:**

Overall Cabling Fillers	Gross web	
Overall Diameter: Overall Nominal Diameter:	0.75 in.	
Individual Cable Diameter:	0.235 in.	

## **Physical Characteristics (Connectivity):**

#### Materials:

Materials

Description	Туре	Material
Plug	RJ45	Polycarbonate
Boot		Elastomer
Front Connection	Blades	Phosphor Bronze with 50u inch Gold over Nickel Plating
Sleeve		Engineered Polymer Riser Rated

Color:		
Boot Color	Translucent	
Wiring Scheme:		

#### Packaging:

Wiring Scheme

Individually packaged in a box. Packaging

## **Mechanical Characteristics (Connectivity):**

RJ45 Plug / Jack Compatibility

T568A/B-T568A/B

Termination Interface

Termination	Connection	Durabilities

Page 1 of 3

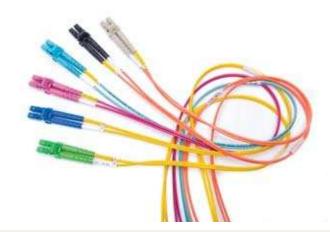


## FP5LDLDxxxM Cable Assemblies - FP - FX PATCH CORD

## **Preview Document. Not Live Data.**

For more Information please call

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## **Description**

FX PATCH CORD, OM5, LC DUPLEX - LC DUPLEX, OFNR, DUPLEX ZIP 2.0 MM, A-TO-B, LIME GREEN JACKET, IN VARIOUS LENGTHS

Usage (	(Overall)	):

Suitable Applications	Data Centers, Main Equipment Rooms, Telecommunications Rooms and Work Area	
Related Parts	FiberExpress Adapter Strips, FiberExpress Manager Modules and FiberExpress Ultra Frames and Cassettes. Workstation Oultlets	

## **Multi Conductor:**

#### **Physical Characteristics:**

**Overall Cabling:** 

Overall Cabling Fillers Refer to cable Technical Specifications

**Overall Diameter:** 

Overall Nominal Diameter: 0.078 x 0.156 in.

## **Physical Characteristics (Connectivity):**

Fiber Type:

Fiber Type 50 Micron (OM5)

### Materials:

Materials

Description	Туре	Material	Color
Connectors for both ends	LC-DUPLEX	Plastic	Lime green
Boot for both ends		Rubber	Lime green
Ferrule for both ends	1.25mm	Zirconia-Ceramic	

## Wiring Scheme:

Wiring Scheme TIA/EIA 568.3-D

#### Packaging:

Packaging Individually packaged in a clear plastic bag.

## **Mechanical Characteristics (Connectivity):**

Storage Temperature Range -40°C To +75°C

Operating Temperature Range -40°C To +75°C

#### Environmental/Mechanical Characteristics

Test (Method)	TIA 568-C.3	Belden
Interconnection Compatibility	TIA/EIA-604-10 (FOCIS 10)	TIA/EIA-604-10 (FOCIS 10)
Thermal Cycling (FOTP-3)	n/a	-40 to 75°C cycling for 7 days
Temperature Life (FOTP-4)	60°C for 4 days	85°C for 7 days

Page 1 of 2 12-17-2019

**ENGLISH MEASUREMENT VERSION** 



#### FP5LDLDxxxM Cable Assemblies - FP - FX PATCH CORD

Humidity (FOTP-5)	90-95% at 40°C for 4 days	95% @ 75°C for 7 days
Durability (FOTP-21)	500 cycles	6 x 200 cycles (3 Elevations)
Cable Retention (FOTP-6)	5.0 kg @ 0 deg., 1.94 kg @ 90 deg.	6.8 kg @ 0 deg., 3.4 kg @ 90 deg.
Flex (FOTP-1)	0.5 kg @ 90° to -90° for 100 cycles	0.9 kg @ 90° to -90° for 100 cycles
Twist (FOTP-36)	1.5 kg for 10 cycles	1.5 kg for 10 cycles

#### Overall Length Tolerances

Range	Tolerance	Range	Tolerance	Range	Tolerance
Sx & Dx Patchcord	Sx & Dx Patchcord	MPO Trunk	MPO Trunk	Multi-Fiber Cable Assembly	Multi-Fiber Cable Assembly
0 to 2 meters	+0.2 / -0 meter	0 to 2 meters	+0.2 / -0 meter	0 to 2 meters	+0.2 / -0 meter
2.1 to 5.0 meters	+0.3 / -0 meter	2.1 to 5.0 meters	+0.3 / -0 meter	2.1 to 5.0 meters	+0.3 / -0 meter
5.1 to 40 meters	+0.4 / -0 meter	5.1 to 20 meters	+0.4 / -0 meter	5.1 to 20 meters	+0.4 / -0 meter
Over 40.1 meters	+ 1.0% / -0%	Over 20.1 meters	+ 1.0% / -0%	Over 20.1 meters	+ 1.3 / -0 meter

## **Applicable Specifications and Agency Compliance (Overall):**

Applicable Standards & Environmental Programs:

UL Rating	Riser
EU Directive 2011/65/EU (ROHS II)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	01/01/2013
MII Order #39 (China RoHS)	EUP 50
Telecommunications Standards	TIA 568.3-D
Safety Listing	ACA
Suitability:	
Suitability - Indoor	Yes

### **Transmission Characteristics (Connectivity):**

Optical Connector Performance

Description	OM1 (62.5 μm)	OM2 (50 μm)	OM3 (50 μm)	OM4 & OM5 (50 μm)	OS2 (Singlemode) UPC	OS2 (Singlemode) APC
Maximum IL (dB) SingleFiber Connector LC - SC - ST	0.25 dB	0.25 dB	0.25 dB	0.15 dB	0.35 dB	0.35 dB
Typical RL (dB) SingleFiber connector LC - SC - ST	-30 dB	-30 dB	-30 dB	-30 dB	-55 dB	-65 dB
Maximum IL (dB) MultiFiber Connector MPO	0.5 dB	0.5 dB	0.35 dB	0.2 dB	-	0.50 dB
Typical RL (dB) MultiFiber Connector MPO	-30 dB	-30 dB	-30 dB	-30 dB	-	-60 dB

## **Electrical Characteristics (Overall):**

Notes (Overall):

**Product Family:** 

Revision Date: 12-17-2019 Revision Number: 0

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## FPSLDLDxxxM Cable Assemblies - FiberExpress Duplex Patch Cord

#### **Preview Document. Not Live Data.**



For more Information please call

1-800-Belden1



## Description

FX PATCH CORD, OS2, LC DUPLEX - LC DUPLEX, 3 M, OFNR, DUPLEX ZIP 2.0 MM, A-TO-B, YELLOW JACKET, IN VARIOUS LENGTHS WITH INCREMENT OF 0.1 METER.

#### Usage (Overall):

Suitable Applications	Data Centers, Main Equipment Rooms, Telecommunications Rooms and Work Area
Related Parts	FiberExpress Adapter Strips, FiberExpress Manager Modules and FiberExpress Ultra Frames and Cassettes. Workstation Oultlets

#### **Multi Conductor:**

#### **Physical Characteristics:**

**Overall Cabling:** 

Overall Cabling Fillers Refer to cable Technical Specifications

**Overall Diameter:** 

Overall Nominal Diameter: 0.078 x 0.156 in.

### **Cable Characteristics (Connectivity):**

#### **Outer Jacket:**

Outer Jacket Color Code Chart



## **Physical Characteristics (Connectivity):**

Fiber Type:

Fiber Type SM, (OS2)

#### Materials:

Materials

Description	Туре	Material	Color
Connector at both ends	LC-DUPLEX	Plastic	Blue
Boot at both ends		Rubber	Blue
Ferrule at both ends	1.25mm	Zirconia-Ceramic	

#### Wiring Scheme:

Wiring Scheme TIA/EIA 568-C.3

Packaging:

Packaging Individually packaged.

## **Mechanical Characteristics (Connectivity):**

Storage Temperature Range -40°C To +75°C

Operating Temperature Range -40°C To +75°C

Environmental/Mechanical Characteristics

Test (Method)	TIA 568-D.3	Belden
Thermal Cycling (FOTP-3)	n/a	-40 to 75°C cycling for 7 days
Temperature Life (FOTP-4)	60°C for 4 days	85°C for 7 days

ENGLISH MEASUREMENT VERSION



## FPSLDLDxxxM Cable Assemblies - FiberExpress Duplex Patch Cord

Humidity (FOTP-5)	90-95% at 40°C for 4 days	95% @ 75°C for 7 days
Durability (FOTP-21)	500 cycles	6 x 200 cycles (3 Elevations)
Cable Retention (FOTP-6)	5.0 kg @ 0 deg.	1.94 kg @90 deg.
Flex (FOTP-1)	0.5 kg @ 90° to -90° for 100 cycles	0.9 kg @ 90° to -90° for 100 cycles
Twist (FOTP-36)	1.5 kg for 10 cycles	1.5 kg for 10 cycles

#### Overall Length Tolerances

Range	Tolerance	Range	Tolerance	Range	Tolerance
Sx & Dx Patchcord	Sx & Dx Patchcord	MPO Trunk	MPO Trunk	Multi-Fiber Cable Assembly	Multi-Fiber Cable Assembly
0 to 2 meters	+0.2 / -0 meter	0 to 2 meters	+0.2 / -0 meter	0 to 2 meters	+0.2 / -0 meter
2.1 to 5.0 meters	+0.3 / -0 meter	2.1 to 5.0 meters	+0.3 / -0 meter	2.1 to 5.0 meters	+0.3 / -0 meter
5.1 to 40 meters	+0.4 / -0 meter	5.1 to 20 meters	+0.4 / -0 meter	5.1 to 20 meters	+0.4 / -0 meter
Over 40.1 meters	+ 1.0% / -0%	Over 20.1 meters	+ 1.0% / -0%	Over 20.1 meters	+ 1.3 / -0 meter

## Applicable Specifications and Agency Compliance (Overall):

Applicable Standards & Environmental Progr	ams:
--	------

UL Rating	Riser
EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	01/01/2006
MII Order #39 (China RoHS)	EUP 50
Safety Listing	ACA, Bi-national Standard Listed
Suitability:	
Suitability - Indoor	Yes

## **Transmission Characteristics (Connectivity):**

**Optical Connector Performance** 

Description	OM1 (62.5 μm)	OM2 (50 μm)	OM3 (50 μm)	OM4 (50 μm)	OS2 (Singlemode) UPC	OS2 (Singlemode) APC
Maximum IL (dB) SingleFiber Connector LC - SC - ST	0.25 dB	0.25 dB	0.25 dB	0.15 dB	0.35 dB	0.35 dB
Typical RL (dB) SingleFiber connector LC - SC - ST	-30 dB	-30 dB	-30 dB	-30 dB	-55 dB	-65 dB
Maximum IL (dB) MultiFiber Connector MPO	0.5 dB	0.5 dB	0.35 dB	0.2 dB	-	0.75 dB
Typical RL (dB) MultiFiber Connector MPO	-30 dB	-30 dB	-30 dB	-30 dB	-	-60 dB

## **Electrical Characteristics (Overall):**

## Notes (Overall):

#### **Product Family:**

Revision Number: 0 Revision Date: 11-19-2014

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## Fiber Express Fusion Splice-on Connectors

roduct Bulletin PB00100



Belden's Fiber*Express* (FX) Fusion connectors enable splice-on technology. They combine the benefits of fusion splicing with the simplicity of a field-installable connector to expand your options for field-termination and improve installation performance and reliability over mechanical splice connectors. No crimping, polishing, or adhesives are required for termination, minimizing installation errors.



- Fewer Splice Management Accessories Required Eliminates need for splice enclosures and splice trays
- Flexible Installations
   Run exact length channels to eliminate cable shorts and excess slack
- Reliable Terminations
   Automated splicing tools consistently provide the highest quality termination
- Superior Technology and Affordable Quality
   A premium solution without the premium price



## **FEATURES**

- Fiber Ferrule is Ready for Termination
   Factory pre-cleaved and pre-cleaned fiber stub
- Better Insertion Loss and Return Loss
   Performance over Mechanical Splice Connectors
   Superior performance critical to support high-bandwidth/high-speed transmission to applications (25G, 40G and 100G)
- Robust Connector for Indoor and Outdoor Applications
   Meets TIA-568-D3 and GR-326/1081\*
- Compatible Splicer Accessories
   FX Fusion holders are compatible with industry leading fusion splicers



## **Ordering Information**

To use the tailored SmartPart configuration matrices, make a selection from each category and combine to form a custom part number. See example(s) below.

## **FX Fusion Multimode Connectors**

Decemention	Belden Part Number					
Description	Mutlimode, OM1 - Beige	Mutlimode, OM3/OM4 - Aqua	Mutlimode, OM4 - Erika Violet			
LC with 900 µm Boot, 1/Pack	FT1LC900FS01	FT3LC900FS01	FT4LC900FS01			
SC with 900 µm Boot, 1/Pack	FT1SC900FS01	FT3SC900FS01	FT4SC900FS01			

## **FX Fusion Singlemode Connectors**

Description	Belden Part Number			
Description	Singlemode, OS2 - Blue	Singlemode, OS2/APC - Green		
LC with 900 µm Boot, 1/Pack	FTSLC900FS01	FTSLB900FS01		
SC with 900 µm Boot, 1/Pack	FTSSC900FS01	FTSSB900FS01		

## **Tailored FX Fusion Field Termination**

Part number example from configuration shown below:

FT3LC900FS01

OM5 TO BE ADDED

FT		3 LC 900		LC		F		S01		
Field Termination	Fiber Type		Connector		(	Cable Type		Family		Packaging
	1	OM1	LC	LC Simplex	900	Tight Buffer	F	Splice-On	S01	Single Pack
	3	ОМЗ	LB	LC/APC Simplex	2MM**	Jacketed				
	4	OM4	sc	SC Simplex						
	S	OS2	SB	SC/APC Simplex						

<sup>\*\*2</sup>MM will be available in spring 2017

## **FX Fusion Accessories**

Description	Belden Part Number
Precision Tool Kit	FXFSTOPTK
Standard Tool Kit	FXFSTOSTK
Precision Cleaver	FXFSTOPCL
Standard Cleaver	FXFSTOSCL
Splice Holder Family 1	FXFSSHFM1*
Splice Holder Family 2	FXFSSHFM2
Slitter for Jacketed Fiber	FXFSTOSLT

<sup>\*</sup>FXFSSHFM1 Holder compatible with Fujikura 60S, Fujikura 70S, Sumitomo Q101, among many others. Visit www.belden.com/splice-on for more details.

# Fiber*Express* Field-Termination FX Fusion Configurator

Part number example from configuration shown below:

**FXFSTOSTK** 

FX	FS		то			STK	
Fiber <i>Express</i>	Product Family		Product Type		Product Type Other Information		
	FS	FX Fusion	то	Tools	SPL	Splicer Kit	
			SH	Splice Holder	PTK	Precision Tool Kit	
				PCL		Precision Cleaver	
					SLT	Slitter for Jacketed Fiber	
					STK Standard Tool Kit		
					SCL Standard Cleaver		
					FM1	Splice Holder Family 1	
					FM2	Splice Holder Family 2	

To learn more call us at **1.800.BELDEN.1** or visit **www.belden.com/splice-on** 

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FX Fusion Connectors\_PB00100\_ECOS\_BDC\_0317\_A\_AG





## FT5LC900FS01 Modular Connectors - FX FUSION LC CONNECTOR

## **Preview Document. Not Live Data.**

For more Information please call

1-800-Belden1



## **Description**

FX FUSION SPLICE-ON CONNECTOR, OM5, LC SIMPLEX, 900UM TIGHT BUFFER/250UM, LIME GREEN HOUSING, 1/PACK

## Usage (Overall):

Suitable Applications	Field-termination of fiber optic cables within Patch Panels, Distribution Frames, Workstation Outlets for FTTD (Fiber to the Desk), drops for FTTH (Fiber to the home) and MDU (Multiple Dwelling Units).
Related Parts	FX Splice-On Installation Kit. FX Pigtails. Not to be used with Breakout kits.

## **Physical Characteristics (Connectivity):**

#### **Dimensions:**

Dimensions

Height (in.)	Width (in.)	Length (in.)
0.380	0.240	3.140

## Materials:

Materials

Description	Material	Color
Boot	Rubber	Black
Protective Ferrule Cap	Plastic	Opaque
Connector Front Housing	Plastic	Lime green
Connector Rear Housing	Nickel plated zinc alloy diecast	
Ferrule	Zirconia-Ceramic	White

## Weight:

Weight: 0.046 lbs.

### **Included Parts:**

900 µm boot, protective ferrule cap, splice protection sleeve **Included Parts** 

## Packaging:

Packaging One (1) connector per pack, each in a dust and moisture resistant clam-shell package

## **Mechanical Characteristics (Connectivity):**

Mechanical Specifications

<u> </u>				
Test	900µm (SM) per GR-326/1081-CORE	90µm (MM) per TIA 568.3-D	250µm (SM) per GR-326/1081-CORE	250µm (MM) per TIA 568.3-D
Intermateability requirements	TIA/EIA-604-10 (LC)	TIA/EIA-604-10 (LC)	TIA/EIA-604-10 (LC)	TIA/EIA-604-10 (LC)
, ,	TIA/EIA-604-3 (SC)	TIA/EIA-604-3 (SC)	TIA/EIA-604-3 (SC)	TIA/EIA-604-3 (SC)
Operating Temperature	-40° to 75°C	-40° to 75°C	-40° to 75°C	-40° to 75°C
Storage Temperature	-40° to 85°C	-40° to 85°C	-40° to 85°C	-40° to 85°C
Durability	200 cycles at 3 ft	4.5 ft and 6 ft	500 cycles	200 cycles at 3 ft
Cable retention	straight pull	N/A	0.51 kgf (1.12 lbf)	N/A
Cable retention	90° pull	N/A	0.20 kgf (0.45 lbf)	N/A

# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



#### FT5LC900FS01 Modular Connectors - FX FUSION LC CONNECTOR

Flex	N/A	0.20 kgf (0.45 lbf)	N/A	0.20 kgf (0.45 lbf)
Twist	0.5 kgf (1.1 lbf)	0.20 kgf (0.45 lbf)	0.5 kgf (1.1 lbf)	0.20 kgf (0.45 lbf)
Transmission with applied load (LC)	0.7 kgf (0°)	0.47 kgf (90°)	N/A	0.5 kgf (0°)
		& 0.17 kgf (135°)		
Transmission with applied load (SC)	0.7 kgf (0° & 90°)	0.25kgf (135°)	N/A	0.5 kgf (0° & 90°)

## **Applicable Specifications and Agency Compliance (Overall):**

#### **Applicable Standards & Environmental Programs:**

Suitability: Suitability - Indoor	Yes - Indoor
Telecommunications Standards	GR-1081-CORE (SM) & TIA 568.3-D (MM)
MII Order #39 (China RoHS)	EUP 50
EU RoHS Compliance Date (mm/dd/yyyy)	01/01/2013
EU Directive 2011/65/EU (ROHS II)	Yes

## **Transmission Characteristics (Connectivity):**

**Transmission Specifications** 

Fiber type	Maximum Insertion Loss	Minimum reflectance
Single-mode UPC	0.3 dB	-55 dB
Single-mode APC	0.3 dB	-65 dB
Multimode OM1	0.25 dB	-25 dB
Multimode OM3, OM4 & OM5	0.2 dB	-25 dB

## Notes (Overall):

## **Product Family:**

Revision Date: 12-17-2019 Revision Number: 0

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METRIC MEASUREMENT VERSION



#### FTSLC900FS01 Modular Connectors - FX FUSION LC CONNECTOR



For more Information please call

1-800-Belden1

#### **General Description:**

FX FUSION SPLICE-ON CONNECTOR, OS2, LC SIMPLEX, 900UM TIGHT BUFFER, BLUE HOUSING, 1/PACK

### Usage (Overall)

Suitable Applications:	Field-termination of fiber optic cables within Patch Panels, Distribution Frames, Workstation Outlets for
	FTTD (Fiber to the Desk), drops for FTTH (Fiber to the home) and MDU (Multiple Dwelling Units).

Related Parts: FX Splice-On Installation Kit, FX Pigtails. Not to be used with Breakout kits.

## **Physical Characteristics (Connectivity)**

### **Dimensions**

#### Dimensions:

Height (mm)	Width (mm)	Length (mm)
9.652	6.096	79.756

#### Materials

#### Materials:

Description	Material	Color
Boot	Rubber	Black
Protective Ferrule Cap	Plastic	Opaque
Connector Front Housing	Plastic	Blue
Connector Rear Housing	Nickel plated zinc alloy diecast	
Ferrule	Zirconia-Ceramic	White

#### Weight

**Weight:** 0.021 kg

**Included Parts** 

Included Parts: 900 μm boot, protective ferrule cap, splice protection sleeve

**Packaging** 

Packaging: One (1) connector per pack, each in a dust and moisture resistant clam-shell package

## **Mechanical Characteristics (Connectivity)**

## Mechanical Specifications:

Test	TIA 568.3-D
Intermateability requirements	FOCIS compliant with latest revision of TIA-604-3 (SC) & TIA-604-10 (LC)
Operating Temperature	-40° to 75°C
Storage Temperature	-40° to 85°C
Durability	500 insertions
Cable retention	straight pull
Cable retention	90° pull
Flex	0.20 kg (0.45 lbf)
Twist	0.20 kg (0.45 lbf)

## **Applicable Specifications and Agency Compliance (Overall)**

**Applicable Standards & Environmental Programs** 

• •	•	
EU Directive 2011/65/EU (ROHS II):	Yes	

Page 1 of 2 10-25-2017

#### METRIC MEASUREMENT VERSION



#### FTSLC900FS01 Modular Connectors - FX FUSION LC CONNECTOR

	EU RoHS Compliance Date (mm/dd/yyyy):	01/01/2013
	MII Order #39 (China RoHS):	EUP 50
	Telecommunications Standards:	TIA 568.3-D
Sui	tability	
	Suitability - Indoor:	Yes - Indoor

#### Transmission Characteristics (Connectivity)

#### Transmission Specifications:

Fiber type	Maximum Insertion Loss	Minimum reflectance
Single-mode UPC	0.3 dB	-55 dB
Single-mode APC	0.3 dB	-65 dB
Multimode OM1	0.25 dB	-25 dB
Multimode OM3 / OM4	0.2 dB	-25 dB

## Notes (Overall)

**Product Family** 

## **Put Ups and Colors:**

Item #	Putup	Ship Weight	Color	Notes	Item Desc
FTSLC900FS01	1 EA	0.224 LB			FX FUSION OS2 LC_SX TB_900

Revision Number: 0 Revision Date: 10-23-2017

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Page 2 of 2



## FCSU06LDMF Faceplates and Panels - FX ULTRA CASSETTE

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For more Information please call

1-800-Belden1





## Description

FX ULTRA CASSETTE, OS2, 06 PORTS, MPO-12 (FEMALE), LC DUPLEX, TYPE-A, BLUE ADAPTERS

## Image:

Image

## Usage (Overall):

Suitable Applications	FiberExpress Ultra Solutions, Backbone, Telecommunications Room, Main Distribution Room, Data Centers
Related Parts	FX UHD & FXU Patch Panels, FX MPO Trunks

## **Physical Characteristics (Connectivity):**

Capacity:

Ma	ax. Capacity	12 Fibers, 6 LC Duplex Bezels

#### Access

Access.		
Front Connection	1 inch Pullout	

### **Dimensions:**

Dimensions

ı	Height (in.)	Width (in.)	Length (in.)
	1.500	4.500	6.600

#### Materials:

Materials

Description	Туре	Material	Color
Cassette assy		Plastic - UL94V-0	Black
Front Connector Body	LC-DUPLEX	Plastic - UL94V-0	Blue
Adapter Sleeve		Zirconia-Ceramic	
Rear Connector Body	MPO Male	Plastic - UL94V-0	Green

## Weight: Weight:

Packaging:	
Packaging	Individually packaged in a plastic shell, Shipped in cardboard box (14/box)

0.500 lbs.

## Mechanical Characteristics (Connectivity):

echanical characteristics (connectivity).			
Storage Temperature Range	-10°C To +75°C		
Operating Temperature Range	-10°C To +60°C		

## Applicable Specifications and Agency Compliance (Overall):

Page 1 of 2 07-27-2017

**ENGLISH MEASUREMENT VERSION** 



## FCSU06LDMF Faceplates and Panels - FX ULTRA CASSETTE

**Applicable Standards & Environmental Programs:** 

EU Directive 2002/95/EC (RoHS) Yes 07/01/2006 EU RoHS Compliance Date (mm/dd/yyyy) **EUP 50** MII Order #39 (China RoHS) Suitability: Yes Suitability - Indoor

## **Transmission Characteristics (Connectivity):**

Transmission Specifications

Description	OM1 (62.5 μm)	OM2 (50 μm)	OM3 (50 μm)	OM4 (50 μm)	OS2 (Singlemode) UPC	OS2 (Singlemode) APC
Maximum IL (dB) SingleFiber Connector LC - SC - ST	0.25 dB	0.25 dB	0.25 dB	0.15 dB	0.35 dB	0.35 dB
Typical RL (dB) SingleFiber connector LC - SC - ST	-30 dB	-30 dB	-30 dB	-30 dB	-55 dB	-65 dB
Maximum IL (dB) MultiFiber Connector MPO	0.5 dB	0.5 dB	0.35 dB	0.2 dB	-	0.75 dB
Typical RL (dB) MultiFiber Connector MPO	-30 dB	-30 dB	-30 dB	-30 dB	-	-60 dB

## Notes (Overall):

Notes

For additional information about this product, please contact our Technical Support group (ibdn.ts@belden.com) or your local sales representative. Ref PEC CODE: BFMO-FXU-MK-SL-LDU-PH-NN

## **Product Family:**

Revision Date: 01-11-2016 Revision Number: 0

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## FCSU06LDMF1B Faceplates and Panels - FX ULTRA CASSETTE

**Preview Document. Not Live Data.** 

For more Information please call

1-800-Belden1





## Description

FX ULTRA CASSETTE, OS2, 06 PORTS, MPO-12 (FEMALE), LC DUPLEX, TYPE-A ALTERNATE, BLUE ADAPTERS

## Image:

Image

## Usage (Overall):

Suitable Applications	FiberExpress Ultra Solutions, Backbone, Telecommunications Room, Main Distribution Room, Data Centers
Related Parts	FX UHD & FXU Patch Panels, FX MPO Trunks

## **Physical Characteristics (Connectivity):**

### Capacity:

	•	
Ма	x. Capacity	12 Fibers, 6 LC Duplex Ports

#### Access

A00033.		
Front Connection	1 inch Pullout	

### **Dimensions:**

Dimensions

Height (in.)	Width (in.)	Length (in.)
1.500	4.500	6.600

#### Materials:

Materials

Description	Туре	Material	Color
Rear Connector Body	MPO Female	Plastic - UL94V-0	Green
Adapter Sleeve		Zirconia-Ceramic	
Front Connector Body	LC-Duplex	Plastic - UL94V-0	Blue
Cassette assy		Plastic - UL94V-0	Black

## Weight: Weight:

Packaging:	
Packaging	Individually packaged in a plastic shell, Shipped in cardboard box (14/box)

0.657 lbs.

## **Mechanical Characteristics (Connectivity):**

moonamoar onaraotoriotico (oomiootiv	··· <i>y</i> /·	
Storage Temperature Range	-10°C To +75°C	
Operating Temperature Range	-10°C To +60°C	

## Applicable Specifications and Agency Compliance (Overall):

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**ENGLISH MEASUREMENT VERSION** 



## FCSU06LDMF1B Faceplates and Panels - FX ULTRA CASSETTE

**Applicable Standards & Environmental Programs:** 

EU Directive 2002/95/EC (RoHS) Yes 07/01/2006 EU RoHS Compliance Date (mm/dd/yyyy) **EUP 50** MII Order #39 (China RoHS) Suitability: Yes Suitability - Indoor

### **Transmission Characteristics (Connectivity):**

Transmission Specifications

Description	OM1 (62.5 μm)	OM2 (50 μm)	OM3 (50 μm)	OM4 (50 μm)	OS2 (Singlemode) UPC	OS2 (Singlemode) APC
Maximum IL (dB) SingleFiber Connector LC - SC - ST	0.25 dB	0.25 dB	0.25 dB	0.15 dB	0.35 dB	0.35 dB
Typical RL (dB) SingleFiber connector LC - SC - ST	-30 dB	-30 dB	-30 dB	-30 dB	-55 dB	-65 dB
Maximum IL (dB) MultiFiber Connector MPO	0.5 dB	0.5 dB	0.35 dB	0.2 dB	-	0.75 dB
Typical RL (dB) MultiFiber Connector MPO	-30 dB	-30 dB	-30 dB	-30 dB	-	-60 dB

### Notes (Overall):

Notes (Cont'd.) "Please refer to the label on the back of the cassette for appropriate front port number configuration."

#### **Product Family:**

Revision Date: 09-22-2014 Revision Number: 0

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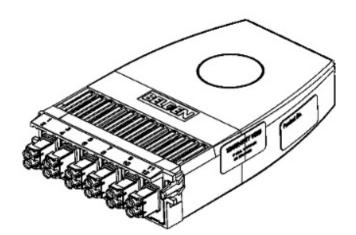
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## FC5U06LDMF Faceplates and Panels - FXU CASSETTE

## **Preview Document. Not Live Data.**



For more Information please call

1-800-Belden1



## **Description**

FX ULTRA CASSETTE, OM5, 06 PORTS, MPO-12 (FEMALE), LC DUPLEX, TYPE-A, LIME GREEN ADAPTERS

## Usage (Overall):

Suitable Applications	FiberExpress Solutions, Backbone, Telecommunications Room, Main Distribution Roor Data Centers
Related Parts	FX UHD & FXU Patch Panels, FX Pigtails, FX Brilliance

## **Physical Characteristics (Connectivity):**

Capacity:

Max. Capacity 12 Fibers, 6 LC Duplex Ports

Access:

Front Connection 1 inch Pullout

**Dimensions:** 

Dimensions

Height (in.)	Width (in.)	Length (in.)
1.500	4.500	6.600

#### Materials:

Materials

Description	Туре	Material	Color
Adapter Sleeve		Zirconia-Ceramic	
Front Connector Body	LC-Duplex	Plastic - UL94V-0	Lime Green
Cassette assy		Plastic - UL94V-0	Black

## Weight:

Weight: 0.657 lbs.

Packaging:

Packaging Individually packaged in a plastic shell, Shipped in cardboard box (14/box)

## **Mechanical Characteristics (Connectivity):**

Storage Temperature Range	-10°C To +75°C
Operating Temperature Range	-10°C To +60°C

ENGLISH MEASUREMENT VERSION



### FC5U06LDMF Faceplates and Panels - FXU CASSETTE

## Applicable Specifications and Agency Compliance (Overall):

<b>Applicable Standards</b>	&	<b>Environmental Programs:</b>
ELLD: 1: 0000/0E	/-	O (D 110)

EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	07/01/2006
MII Order #39 (China RoHS)	EUP 50
Suitability: Suitability - Indoor	Yes

## **Transmission Characteristics (Connectivity):**

#### Notes (Overall):

Notes

Splice holders are included (total of 24 splices). 3 variants of splice holders are supplied with the splice cassette, they can accommodate for the 900-900µm, the 900-250µm, the 250-250µm, and the 12F RIBBON splice protectors. Pigtails are not included they need to be ordered separately.

For additional information about this product, please contact our Technical Support group (ibdn.ts@belden.com) or your local sales representative.

## **Product Family:**

Revision Number: 0 Revision Date: 01-16-2020

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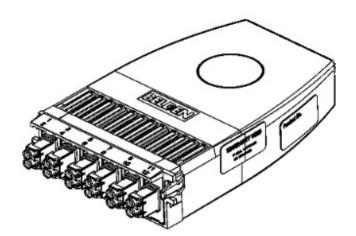
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## FC5U06LDMF1L Faceplates and Panels - FXU CASSETTE

## **Preview Document. Not Live Data.**



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## **Description**

FX ULTRA CASSETTE, OM5, 06 PORTS, MPO-12 (FEMALE), LC DUPLEX, TYPE-A ALTERNATE, LIME GREEN ADAPTERS

## Usage (Overall):

Suitable Applications	FiberExpress Solutions, Backbone, Telecommunications Room, Main Distribution Roor Data Centers
Related Parts	FX UHD & FXU Patch Panels, FX Pigtails, FX Brilliance

## **Physical Characteristics (Connectivity):**

Capacity:

Max. Capacity 12 Fibers, 6 LC Duplex Ports

Access:

Front Connection 1 inch Pullout

**Dimensions:** 

**Dimensions** 

Height (in.)	Width (in.)	Length (in.)
1.500	4.500	6.600

#### Materials:

Materials

Description	Туре	Material	Color
Adapter Sleeve		Zirconia-Ceramic	
Front Connector Body	LC-Duplex	Plastic - UL94V-0	Lime Green
Cassette assy		Plastic - UL94V-0	Black

## Weight:

Weight: 0.657 lbs.

Packaging:

Packaging Individually packaged in a plastic shell, Shipped in cardboard box (14/box)

## **Mechanical Characteristics (Connectivity):**

Storage Temperature Range	-10°C To +75°C
Operating Temperature Range	-10°C To +60°C

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ENGLISH MEASUREMENT VERSION



### FC5U06LDMF1L Faceplates and Panels - FXU CASSETTE

## Applicable Specifications and Agency Compliance (Overall):

Applicable Standards & Environmental Programs:	
EU Directive 2002/95/EC (RoHS)	Yes

EU RoHS Compliance Date (mm/dd/yyyy)	07/01/2006
MII Order #39 (China RoHS)	EUP 50
Suitability: Suitability - Indoor	Yes

## Transmission Characteristics (Connectivity):

#### Notes (Overall):

Notes

Splice holders are included (total of 24 splices). 3 variants of splice holders are supplied with the splice cassette, they can accommodate for the 900-900µm, the 900-250µm, the 250-250µm, and the 12F RIBBON splice protectors. Pigtails are not included they need to be ordered separately.

For additional information about this product, please contact our Technical Support group (ibdn.ts@belden.com) or your local sales representative.

#### **Product Family:**

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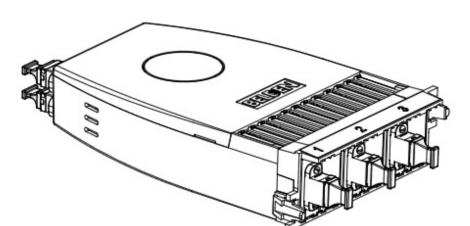
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## FC5U034MMF Faceplates and Panels - FX ULTRA OPTIMIZER CASSETTE

## **Preview Document. Not Live Data.**



For more Information please call

1-800-Belden1



## **Description**

FX ULTRA OPTIMIZER CASSETTE, OM5, 03 PORTS, MPO-12 (FEMALE), MPO-12(MALE) 8F, 40G/100G SR4, LIME GREEN **ADAPTERS** 

#### Usage (Overall):

Suitable Applications	FiberExpress Ultra Solutions, Backbone, Telecommunications Room, Main Distribution Room, Data Centers
Related Parts	FX UHD & FXU Patch Panels, FX MPO Trunks

## **Physical Characteristics (Connectivity):**

## Capacity:

Access:

1 inch Pullout Front Connection

## **Dimensions:**

**Dimensions** 

Height (in.)	Width (in.)	Length (in.)	
1.500	4.500	6.600	

#### Materials:

Materials

Description	Туре	Material	Color
Adapter Sleeve		Zirconia-Ceramic	
Front Connector Body	LC-Duplex	Plastic - UL94V-0	Lime Green
Cassette assy		Plastic - UI 94V-0	Black

## Weight:

Weight: 0.619 lbs.

#### Packaging:

Packaging Individually packaged in a plastic shell, Shipped in cardboard box (14/box)

## **Mechanical Characteristics (Connectivity):**

-10°C To +75°C Storage Temperature Range

ENGLISH MEASUREMENT VERSION



### FC5U034MMF Faceplates and Panels - FX ULTRA OPTIMIZER CASSETTE

Operating Temperature Range -10°C To +60°C

### Applicable Specifications and Agency Compliance (Overall):

#### **Applicable Standards & Environmental Programs:**

EU Directive 2002/95/EC (RoHS)
Yes

EU RoHS Compliance Date (mm/dd/yyyy)
07/01/2006

MII Order #39 (China RoHS)
EUP 50

Suitability:

Suitability - Indoor Yes

## Transmission Characteristics (Connectivity):

Transmission Specifications

Description	OM1 (62.5 μm)	OM2 (50 μm)	OM3 (50 μm)	OM4 & OM5 (50 μm)		
					UPC	APC
Maximum IL (dB) SingleFiber Connector	0.25 dB	0.25 dB	0.25 dB	0.15 dB	0.35 dB	0.35 dB
LC - SC - ST						
Typical RL (dB) SingleFiber connector	-30 dB	-30 dB	-30 dB	-30 dB	-55 dB	-65 dB
LC - SC - ST						
Maximum IL (dB) MultiFiber Connector MPO	0.5 dB	0.5 dB	0.35 dB	0.2 dB	-	0.50 dB
Typical RL (dB) MultiFiber Connector MPO	-30 dB	-30 dB	-30 dB	-30 dB		-60 dB

#### Notes (Overall):

Notes (Cont'd.)

"Please refer to the label on the back of the cassette for appropriate front port number configuration."

#### **Product Family:**

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#### FM5MMB1xxxM Cable Assemblies - FM MPO TRUNK ASSEMBLY

## **Preview Document. Not Live Data.**



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1-800-Belden1

## **Description**

FX MPO TRUNK, OM5, MPO-12(MALE TO MALE), TYPE-B, 1 MPO (12 FIBERS), OFNP MINI-DISTRIBUTION 4.8 MM (DOUBLE JACKET), FAN-OUT: 0.5M x IN-LINE, YELLOW JACKET, IN VARIOUS LENGTHS

## Usage (Overall):

Suitable Applications	Data Centers, Main Equipment Rooms, Telecommunications Rooms
Related Parts	FX Ultra & Ultra HD Cassettes and Frames, FX Manager Connector Modules

#### **Multi Conductor:**

#### **Physical Characteristics:**

**Overall Cabling:** 

Overall Cabling Fillers	Refer to cable Technical Specifications
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**Overall Diameter:** 

Overall Nominal Diameter: 0.189 in.

## **Physical Characteristics (Connectivity):**

Fiber Type:

i iboi i ypo.		
Fiber Type	50 Micron (OM5)	

### Materials:

Materials

Description	Туре	Material	Color
Connectors at both ends	MPO Male	Plastic	Lime green
Boots at both ends		Rubber	Black

## Wiring Scheme:

Wiring Scheme	TIA/EIA 568.3
---------------	---------------

Packaging:

uokuging.	
Packaging	Individually packaged

## **Mechanical Characteristics (Connectivity):**

Storage Temperature Range	-10°C To +60°C
Operating Temperature Range	-10°C To +60°C

### Environmental/Mechanical Characteristics

Test (Method)	TIA 568.3
Humidity (FOTP-5)	90-95% @ 40°C for 4 days
Temperature Life (FOTP-4)	60°C for 4 days
Cable Retention (FOTP-6)	5.0 kg @ 0 deg.
Durability (FOTP-21)	500 cycles
Twist (FOTP-36)	1.5 kg for 10 cycles
	0.5 kg @ 90° to -90° for 100 cycles
Low Temperature (FOTP-188)	-10°C for 4 days

#### **Overall Length Tolerances**

Range	Tolerance	Range	Tolerance	Range	Tolerance
Sx & Dx Patchcord	Sx & Dx Patchcord	MPO Trunk	MPO Trunk	Multi-Fiber Cable Assembly	Multi-Fiber Cable Assembly
0 to 2 meters	+0.2 / -0 meter	0 to 2 meters	+0.2 / -0 meter	0 to 2 meters	+0.2 / -0 meter
2.1 to 5.0 meters	+0.3 / -0 meter	2.1 to 5.0 meters	+0.3 / -0 meter	2.1 to 5.0 meters	+0.3 / -0 meter

ENGLISH MEASUREMENT VERSION



#### FM4MMB1xxxM Cable Assemblies - FM MPO TRUNK ASSEMBLY

UL Rating	Plenum
EU Directive 2011/65/EU (ROHS II)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	01/01/2013
MII Order #39 (China RoHS)	Yes
Safety Listing	ACA, Bi-national Standard Listed
Suitability:	
Suitability - Indoor	Yes

## **Transmission Characteristics (Connectivity):**

Optical Connector Performance

Description	OM1 (62.5 μm)	OM2 (50 μm)	OM3 (50 μm)	OM4 (50 μm)	OS2 (Singlemode) UPC	OS2 (Singlemode) APC
Maximum IL (dB) SingleFiber Connector LC - SC - ST	0.25 dB	0.25 dB	0.25 dB	0.15 dB	0.35 dB	0.35 dB
Typical RL (dB) SingleFiber connector LC - SC - ST	-30 dB	-30 dB	-30 dB	-30 dB	-55 dB	-65 dB
Maximum IL (dB) MultiFiber Connector MPO	0.5 dB	0.5 dB	0.35 dB	0.2 dB	-	0.75 dB
Typical RL (dB) MultiFiber Connector MPO	-30 dB	-30 dB	-30 dB	-30 dB	-	-60 dB

## **Electrical Characteristics (Overall):**

Notes (Overall):

**Product Family:** 

Revision Number: 0 Revision Date: 11-18-2016

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ENGLISH MEASUREMENT VERSION



#### FMSMMB1xxxM Cable Assemblies - FM MPO TRUNK ASSEMBLY

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1-800-Belden1



#### Description

FX MPO TRUNK, OS2, MPO-12(MALE TO MALE), TYPE-B, 1 MPO (12 FIBERS), OFNP, MINI-DISTRIBUTION 4.8 MM (DOUBLE JACKET), YELLOW JACKET IN VARIOUS LENGTHS

Usage (	(Overall	l):
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Suitable Applications	Data Centers, Main Equipment Rooms, Telecommunications Rooms
Related Parts	FX Ultra & Ultra HD Cassettes and Frames, FX Manager Connector Modules

#### **Multi Conductor:**

## **Physical Characteristics:**

Overall Cabling:

Overall Cabling Fillers Refer to cable Technical Specifications

**Overall Diameter:** 

Overall Nominal Diameter: 0.189 in.

## **Physical Characteristics (Connectivity):**

Fiber Type:

Fiber Type SM, (OS2)

## Materials:

Materials

Description	Туре	Material	Color
Connectors at both ends	MPO Male	Plastic	Green
Boots at both ends		Rubber	Black

## Wiring Scheme:

Wiring Scheme TIA/EIA 568-C.3

Packaging:

Packaging Individually packaged

## **Mechanical Characteristics (Connectivity):**

Storage Temperature Range	-10°C To +60°C	
Operating Temperature Range	-10°C To +60°C	

### Environmental/Mechanical Characteristics

Test (Method)	TIA 568-C.3
Humidity (FOTP-5)	90-95% @ 40°C for 4 days
Temperature Life (FOTP-4)	60°C for 4 days
Cable Retention (FOTP-6)	5.0 kg @ 0 deg.
Durability (FOTP-21)	500 cycles
Twist (FOTP-36)	1.5 kg for 10 cycles
Flex (FOTP-1)	0.5 kg @ 90° to -90° for 100 cycles
Low Temperature (FOTP-188)	-10°C for 4 days

#### Overall Length Tolerances

Range	Tolerance	Range	Tolerance	Range	Tolerance
Sx & Dx Patchcord	Sx & Dx Patchcord	MPO Trunk	MPO Trunk	Multi-Fiber Cable Assembly	Multi-Fiber Cable Assembly
0 to 2 meters	+0.2 / -0 meter	0 to 2 meters	+0.2 / -0 meter	0 to 2 meters	+0.2 / -0 meter
2.1 to 5.0 meters	+0.3 / -0 meter	2.1 to 5.0 meters	+0.3 / -0 meter	2.1 to 5.0 meters	+0.3 / -0 meter
5.1 to 40 meters	+0.4 / -0 meter	5.1 to 20 meters	+0.4 / -0 meter	5.1 to 20 meters	+0.4 / -0 meter
Over 40.1 meters	+ 1.0% / -0%	Over 20.1 meters	+ 1.0% / -0%	Over 20.1 meters	+ 1.3 / -0 meter

## **Applicable Specifications and Agency Compliance (Overall):**

**Applicable Standards & Environmental Programs:** 

Page 1 of 2 11-18-2016

ENGLISH MEASUREMENT VERSION



## FMSMMB1xxxM Cable Assemblies - FM MPO TRUNK ASSEMBLY

UL Rating	Plenum
EU Directive 2011/65/EU (ROHS II)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	01/01/2013
MII Order #39 (China RoHS)	Yes
Safety Listing	ACA, Bi-national Standard Listed
Suitability:	
Suitability - Indoor	Yes

## **Transmission Characteristics (Connectivity):**

Optical Connector Performance

Description	OM1 (62.5 μm)	OM2 (50 μm)	OM3 (50 μm)	OM4 (50 μm)	OS2 (Singlemode) UPC	OS2 (Singlemode) APC
Maximum IL (dB) SingleFiber Connector LC - SC - ST	0.25 dB	0.25 dB	0.25 dB	0.15 dB	0.35 dB	0.35 dB
Typical RL (dB) SingleFiber connector LC - SC - ST	-30 dB	-30 dB	-30 dB	-30 dB	-55 dB	-65 dB
Maximum IL (dB) MultiFiber Connector MPO	0.5 dB	0.5 dB	0.35 dB	0.2 dB	-	0.75 dB
Typical RL (dB) MultiFiber Connector MPO	-30 dB	-30 dB	-30 dB	-30 dB	-	-60 dB

## **Electrical Characteristics (Overall):**

Notes (Overall):

**Product Family:** 

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# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



## CA221xx000A06 Cable Assemblies - 10GX Pre-Terminated Cable Assembly

## **Preview Document. Not Live Data.**



For more Information please call

1-800-Belden1



## **Description**

10GX Pre-Terminated Cable Assembly, Bonded-Pair, 4-Pair, 23 AWG Solid, T568A/B-T568A/B, 6 Cables, CMP

## Usage (Overall):

Suitable Applications	IBDN System 10GX, TIA Category 6A, 10GBASE-T
Related Parts	10GX RJ45 Couplers, 10GX Coupler Patch Panels

## **Multi Conductor:**

#### **Physical Characteristics:**

#### Conductor:

AWG

# Pairs	AWG	Stranding	Conductor Material
4	23	Solid	BC - Bare Copper

#### Insulation:

Insulation Material



#### Inner Jacket:

Inner Jacket Material



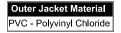
#### **Outer Shield:**

Outer Shield Material

Outer Shield Trade Name	Туре	Outer Shield Material
Floating Screen	Foil	AL - Aluminum

#### **Outer Jacket:**

**Outer Jacket Material** 



## **Overall Cabling:**

Overall Cabling Fillers	Cross Web	
Overall Diameter:		
Overall Nominal Diameter:	0.9 in.	
Individual Cable Diameter:	0.285 in.	

## **Physical Characteristics (Connectivity):**

## Materials:

Materials

Description	n	Туре	Material
Plug		RJ45	Polycarbonate
Boot			Elastomer
Front Conn	ection	Blades	Phosphor Bronze with 50u inch Gold over Nickel Plating

Page 1 of 4

# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



## CA221xx000A06 Cable Assemblies - 10GX Pre-Terminated Cable Assembly

or neme:		Translucent	
		Translucent	
neme:			
cheme		T568A/B-T568A/B	
): Ig		Individually packago	ed in a box.
l Characte	ristics (Conne	ctivity):	
ck Compatib	ility	RJ45	
ion Interface			
Temperature	Range	-40°C To +70°C	
on Temperat	ure Range	-10°C To +60°C	
g Temperatu	ire Range	-10°C To +60°C	
commended	Pull Tension:	25 lbs.	
d Radius (O	verall Cable):	1.040 in.	
	I Characte Ck Compatib on Interface mination Com RJ45 Mate Temperature on Temperat g Temperature commended	g  I Characteristics (Connector Connector Compatibility  on Interface  mination Connection Durable	I Characteristics (Connectivity):  Ck Compatibility  RJ45  On Interface  mination Connection Durabilities  RJ45   Mated Connection 750 Cycles  Temperature Range -40°C To +70°C  on Temperature Range -10°C To +60°C  g Temperature Range -10°C To +60°C  commended Pull Tension: 25 lbs.

## **Applicable Specifications and Agency Compliance (Overall):**

Applicable	Standard	s &	<b>Environmental</b>	Programs:
------------	----------	-----	----------------------	-----------

UL Rating	Plenum
Other Standards	FCC Part 68, Subpart F, IEC 60603-7
EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	01/01/2009
MII Order #39 (China RoHS)	EUP 50
Telecommunications Standards	ISO/IEC 11801:2002 Amendment 2
Safety Listing	Bi-national Standard Listed
uitability:	
Suitability - Indoor	Yes

## **Transmission Characteristics (Connectivity):**

## Performance Table 1

Frequency (MHz)	Max. Insertion Loss	Max. Insertion Loss		Min PSNEXT		Min. PSACRF
	TIA* (dB)	Belden (dB)	TIA* (dB)	Belden (dB)	TIA* (dB)	Belden (dB)
1.000	2.500	2.400	72.300	72.300	64.800	64.800
4.000	4.600	4.500	63.300	63.300	52.800	52.800
8.000	6.400	6.300	58.800	58.800	46.700	46.700
10.000	7.100	7.000	57.300	57.300	44.800	44.800
16.000	9.000	8.900	54.200	54.300	40.700	40.700
20.000	10.100	10.000	52.800	52.800	38.800	38.800
25.000	11.300	11.100	51.300	51.300	36.800	36.800
31.250	12.600	12.500	49.900	49.900	34.900	34.900
62.500	18.000	17.900	45.400	45.400	28.900	28.900
100.000	22.900	22.800	42.300	42.300	24.800	24.800
200.000	33.100	33.000	37.800	37.800	18.800	20.900

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# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



#### CA221xx000A06 Cable Assemblies - 10GX Pre-Terminated Cable Assembly

250.000	37.300	37.200	36.300	36.300	16.800	16.800
300.000	41.200	41.000	35.100	35.200	15.300	15.300
400.000	48.100	48.000	33.300	33.300	12.800	13.900
500.000	54.400	54.300	31.800	31.800	10.800	11.700
625.000		61.500		30.400		8.800

Performance Table - Footnote

100 meter Cable Specifications - \* TIA/EIA-568-B.2-10-2008 Category 6A Standard

#### Performance Table 2

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden (dB)	Min. PSANEXT TIA* (dB)	Min. PSANEXT Belden (dB)	Min. PSAACR-F TIA* (dB)	Min. PSAACR-F Belden (dB)	Min. Balanced TCL TIA* (dB)	Min. Balanced TCL Belden (dB)
1.000	20.000	20.000	67.000	87.000	67.000	75.000	40.000	48.000
4.000	23.000	23.000	67.000	87.000	66.200	75.000	40.000	48.000
8.000	24.500	24.500	67.000	87.000	60.100	75.000	40.000	48.000
10.000	25.000	25.000	67.000	87.000	58.200	75.000	40.000	48.000
16.000	25.000	25.000	67.000	87.000	54.100	70.900	38.000	46.000
20.000	25.000	25.000	67.000	87.000	52.200	69.000	37.000	45.000
25.000	24.200	25.000	67.000	87.000	50.200	67.000	36.000	44.000
31.250	23.300	25.000	67.000	87.000	48.300	65.100	35.100	43.100
62.500	20.700	25.000	65.600	85.600	42.300	59.100	32.000	40.000
100.000	19.000	25.000	62.500	82.500	38.200	55.000	30.000	38.000
200.000	16.400	21.000	58.000	78.000	32.200	49.000	27.000	35.000
250.000	15.600	20.500	56.500	76.500	30.200	47.000	26.000	34.000
300.000	14.900	20.100	55.300	75.300	28.700	43.800	25.200	33.200
400.000	13.800	19.500	53.500	73.500	26.200	38.800	24.000	32.000
500.000	13.000	18.400	52.000	72.000	24.200	35.000	23.000	31.000
625.000		17.400		65.000		31.100		

Dielectric Strength	1,000 V RMS @ 60 Hz for 1 minute
Current Rating:	1.500 A
Insulation Resistance	500 M-Ohm Minimum
Max. Contact Resistance	20 m-Ohm

#### **Electrical Characteristics (Overall):**

#### Labeling:

Labeled at both ends: Part Number, Serial Number, Termination Scheme, Length, Labeling

Individual cable identification. Customized Labeling for cable assemblies optional upon request.

#### Notes (Overall):

Notes

CA221xx000A06 is subdivided as following CA-22-1-xx-010-A-06 where CA stands for performance, 22 stands for jacket type, 1 stands for termination type, xx stands for color, 000 stands for length, A stands for assembly, and 06 stands for number of cables Use "000" part of the code to specify length in feet - 006-100 ft in increments of 1 ft - 105-265 ft in increments of 5 ft

#### **Product Family:**

Product List

Description	Black	Blue	White
6 ft. (1.8 m)	CA22100006A06	CA22106006A06	CA22109006A06
10 ft. (3.0 m)	CA22100010A06	CA22106010A06	CA22109010A06
100 ft. (30.5 m)	CA22100100A06	CA22106100A06	CA22109100A06

Revision Number: 1 Revision Date: 02-11-2013

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**ENGLISH MEASUREMENT VERSION** 



#### CA221xx000A06 Cable Assemblies - 10GX Pre-Terminated Cable Assembly

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**ENGLISH MEASUREMENT VERSION** 



#### C6011xx000A06 Cable Assemblies - 3600 Pre-Terminated Cable Assembly

#### **Preview Document. Not Live Data.**



For more Information please call

1-800-Belden1



#### Description

3600 Pre-Terminated Cable Assembly, Bonded-Pair, 4-Pair, 23 AWG Solid, T568A/B-T568A/B, 6 Cables, CMR.

#### Usage (Overall):

Suitable Applications	IBDN System 3600, TIA Category 6
Related Parts	CAT6+ RJ45 Couplers, CAT6+ Coupler Patch Panels

#### **Multi Conductor:**

#### **Physical Characteristics:**

#### Conductor:

**AWG** 

# Pairs	AWG	Stranding	Conductor Material
4	23	Solid	BC - Bare Copper

#### Insulation:

Insulation Material



#### **Outer Jacket:**

**Outer Jacket Material** 

### Outer Jacket Material PVC - Polyvinyl Chloride

### **Overall Cabling:**

Overall Cabling Fillers	Gross web	
Overall Diameter: Overall Nominal Diameter:	0.75 in.	
Individual Cable Diameter:	0.235 in.	

#### **Physical Characteristics (Connectivity):**

#### Materials:

Materials

Description	Туре	Material
Plug	RJ45	Polycarbonate
Boot		Elastomer
Front Connection	Blades	Phosphor Bronze with 50u inch Gold over Nickel Plating
Sleeve		Engineered Polymer Riser Rated

Color:		
Boot Color	Translucent	
Wiring Scheme:		

#### Packaging:

Wiring Scheme

Individually packaged in a box. Packaging

### **Mechanical Characteristics (Connectivity):**

RJ45 Plug / Jack Compatibility

T568A/B-T568A/B

Termination Interface

Termination	Connection	Durabilities

Page 1 of 3

# **Detailed Specifications & Technical Data ENGLISH MEASUREMENT VERSION**



#### C6011xx000A06 Cable Assemblies - 3600 Pre-Terminated Cable Assembly

RJ45 Mated Connection 750 Cycles	
Storage Temperature Range	-40°C To +70°C
Installation Temperature Range	-10°C To +60°C
Operating Temperature Range	-10°C To +60°C
Max. Recommended Pull Tension:	25 lbs.
Min. Bend Radius (Overall Cable):	1.040 in.

### Applicable Specifications and Agency Compliance (Overall):

**Applicable Standards & Environmental Programs:** 

ÜL Rating	Riser
Other Standards	FCC Part 68, Subpart F, IEC 60603-7
EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	08/01/2009
MII Order #39 (China RoHS)	EUP 50
Telecommunications Standards	Category 6 - TIA 568.C.2, ISO/IEC 11801:2002 Ed.2
Safety Listing	Bi-national Standard Listed
Suitability:	Ves

Suitability - Indoor

#### **Transmission Characteristics (Connectivity):**

#### Performance Table 1

Frequency (MHz)	Max. Insertion Loss TIA* (dB)	Max. Insertion Loss Belden (dB)		Min PSNEXT Belden (dB)		Min. PSACRF Belden (dB)
1.000	2.400	2.000	72.300	77.300	64.800	69.800
4.000	4.500	3.700	63.300	68.300	52.800	57.700
8.000	6.400	5.200	58.800	63.800	46.700	51.700
10.000	7.100	5.800	57.300	62.300	44.800	49.800
16.000	9.100	7.400	54.200	59.300	40.700	45.700
20.000	10.200	8.300	52.800	57.800	38.800	43.700
25.000	11.400	9.300	51.300	56.400	36.800	41.800
31.250	12.800	10.400	49.900	54.900	34.900	39.900
62.500	18.500	15.000	45.400	50.400	28.900	33.800
100.000	23.800	19.300	42.300	47.300	24.800	29.800
200.000	34.800	28.300	37.800	42.800	18.800	23.700
250.000	39.400	32.100	36.300	41.400	16.800	21.800
300.000		35.600		40.200		20.200

Performance Table - Footnote

100 meter Cable Specifications - \* TIA/EIA-568-C.2 Category 6 Standard

### Performance Table 2

Frequency (MHz)	Min. Return Loss TIA* (dB)	Min. Return Loss Belden (dB)	Min. Balanced TCL TIA* (dB)	Min. Balanced TCL Belden (dB)
1.000	20.000	20.000	40.000	42.000
4.000	23.000	23.000	40.000	42.000
8.000	24.500	24.500	40.000	42.000
10.000	25.000	25.000	40.000	42.000
16.000	25.000	25.000	38.000	40.000
20.000	25.000	25.000	37.000	39.000
25.000	24.200	25.000	36.000	38.000
31.250	23.300	25.000	35.100	37.100

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ENGLISH MEASUREMENT VERSION



#### C6011xx000A06 Cable Assemblies - 3600 Pre-Terminated Cable Assembly

62.500	20.700	25.000	32.000	34.000
100.000	19.000	25.000	30.000	32.000
200.000	16.400	21.600	27.000	29.000
250.000	15.600	20.500	26.000	28.000
300.000		20.100		

Dielectric Strength	1,000 V RMS @ 60 Hz for 1 minute	
Current Rating:	1.500 A	
Insulation Resistance	500 M-Ohm Minimum	
Max. Contact Resistance	20 m-Ohm	

#### **Electrical Characteristics (Overall):**

#### Labeling:

Labeling

Labeled at both ends: Part Number, Serial Number, Termination Scheme, Length, Individual cable identification. Customized Labeling for cable assemblies optional upon request.

#### Notes (Overall):

Notes

C6011xx000A06 is subdivided as following C6-01-1-xx-000-A-06 where C6 stands for performance, 01 stands for jacket type, 1 stand for termination type, xx stands for color, 000 stands for length, A stands for assembly, and 06 stands for number of cables Use "000" part of the code to specify length in feet - 006-050 ft in increments of 1 ft - 055-295 ft in increments of 5 ft

Notes (Cont'd.) www.belden.com/p

#### **Product Family:**

Product List

Description	Black	Blue	White
6 ft. (1.8 m)	C601100006A06	C601106006A06	C601109006A06
10 ft. (3.0 m)	C601100010A06	C601106010A06	C601109010A06
100 ft. (30.5 m)	C601100100A06	C601106100A06	C601109100A06

Revision Number: 0 Revision Date: 03-11-2014

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**ENGLISH MEASUREMENT VERSION** 



#### AX104592 Faceplates and Panels - KeyConnect Patch Panel - KeyConnect

**Preview Document. Not Live Data.** 



For more Information please call

1-800-Belden1





#### **Description**

KeyConnect Patch Panel, 48-port, 1U, with 10GX RJ45 Coupler, Black

#### Usage (Overall):

Suitable Applications

Compatible with a variety of modules that are suitable for use with Belden IBDN System.

10GX.

Related Parts

Compatible with 10GX Patch Cord and 10GX Pre-Terminated Cable Assemblies.

#### **Physical Characteristics (Connectivity):**

#### Capacity:

Max. Capacity 48 connectors

#### Access:

Front Connection Flush
Termination Area Rear

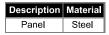
#### **Dimensions:**

Dimensions

Height (in.)	Width (in.)	Depth (in.)
1.750	19.000	1.300

#### Materials:

Materials



#### Color:

Color Titanium

### Weight:

Weight: 1 lbs.

### **Included Parts:**

Included Parts 4 Screws (10x32); 4 Screws (12x24); 1 Printable LabelFlex Half-Sheet; 2 Velcro Straps; 2 Rear Cable Management Bracket; 1 Installation Guide

### Packaging:

Packaging Individually packaged in a cardboard box.

### **Mechanical Characteristics (Connectivity):**

Storage Temperature Range	-40°C To +70°C	
Installation Temperature Range	-10°C To +60°C	
Operating Temperature Range	-10°C To +60°C	

#### Applicable Specifications and Agency Compliance (Overall):

<b>Applicable Standards &amp; Environmental Programs:</b>
ELL Discotius 2002/05/EC (Dollo)

EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	01/10/2008

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ENGLISH MEASUREMENT VERSION



#### AX104592 Faceplates and Panels - KeyConnect Patch Panel - KeyConnect

MII Order #39 (China RoHS)	Yes
Safety Listing	ACA, Bi-national Standard Listed
Suitability:	
Suitability - Indoor	Yes

#### **Transmission Characteristics (Connectivity):**

#### Notes (Overall):

Notes

For proper installation refer to Installation Guide PX104691 included with the product or visit our web site at http://www.belden.com/pdfs/Techpprs/InstallationGuide.pdf

Notes (Cont'd.)

Refer to AX104024 for the Specifications of the 10GX Couplers.

#### **Product Family:**

Part Numbers

	Item Number
KeyConnect PP 10GX, 1U24P wt coupler, Titanium	
KeyConnect PP 10GX, 2U48P wt coupler, Titanium	
KeyConnect PP 10GX, 1U24P, Titanium	AX103254
KeyConnect PP 10GX, 2U48P, Titanium	AX103256
KeyConnect UHDPP 10GX, 1U48P, Titanium	AX103264
KeyConnect PP 10GX, 1U48P, wt coupler, Titanium	AX104592

Revision Number: 0 Revision Date: 11-27-2014

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**ENGLISH MEASUREMENT VERSION** 



#### AX104591 Faceplates and Panels - KeyConnect Patch Panel - KeyConnect

#### **Preview Document. Not Live Data.**



For more Information please call

1-800-Belden1





#### **Description**

KeyConnect Patch Panel, 48-port, 1U, with CAT6+ RJ45 Coupler, Black

#### Usage (Overall):

Suitable Applications	Compatible with a variety of modules that are suitable for use with Belden IBDN System 10GX.
Related Parts	Compatible with CAT6+ Patch Cord and CAT6+ Pre-Terminated Cable Assemblies.

#### **Physical Characteristics (Connectivity):**

#### Capacity:

Max. Capacity	48 connectors	
Access:		
Front Connection	Flush	

Rear **Termination Area** 

#### **Dimensions:**

**Dimensions** 

Height (in.)	Width (in.)	Depth (in.)
1.750	19.000	1.300

#### Materials:

Materials

Description	Material
Panel	Steel

Cold	or:
Co	lor

Weight:		
Weight:	1 lbs.	
In alread Dantas		

Black

#### Included Parts: Included Parts

Packaging:

molacca i arts.	
Included Parts	4 Screws (10x32); 4 Screws (12x24); 1 Printable LabelFlex Half-Sheet; 2 Velcro Straps;
	2 Rear Cable Management Bracket, 1 Installation Guide

Individually packaged in a cardboard box.

### Packaging

**Mechanical Characteristics (Connectivity):** 

Storage Temperature Range	-40°C To +70°C	
Installation Temperature Range	-10°C To +60°C	
Operating Temperature Range	-10°C To +60°C	

#### **Applicable Specifications and Agency Compliance (Overall):**

EU Directive 2002/95/EC (RoHS)	Yes
EU RoHS Compliance Date (mm/dd/yyyy)	01/10/2008
MII Order #39 (China RoHS)	Yes

Page 1 of 2

ENGLISH MEASUREMENT VERSION



#### AX104591 Faceplates and Panels - KeyConnect Patch Panel - KeyConnect

ACA, Bi-national Standard Listed Safety Listing Suitability: Suitability - Indoor Yes

#### **Transmission Characteristics (Connectivity):**

#### Notes (Overall):

For proper installation refer to Installation Guide PX104691 included with the product or visit our web site at Notes http://www.belden.com/pdfs/Techpprs/InstallationGuide.pdf

Notes (Cont'd.)

Refer to AX104215 for the Specifications of the Couplers.

#### **Product Family:**

Part Numbers

·	Item Number
KeyConnect PP CAT6, 1U24P, Black	AX103253
KeyConnect PP CAT6, 2U48P, Black	AX103255
KeyConnect UHDPP CAT6, 1U48P, Black	AX103263
KeyConnect PP CAT6, 1U24P wt couplers, Black	
KeyConnect PP CAT6, 2U48P wt couplers, Black	
KeyConnect PP CAT6, 1U48P wt couplers, Black	AX104591

Revision Number: 0 Revision Date: 08-23-2011

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APPENDIX E.2: COMMSCOPE UNIPRISE CAT6 CS37 STRUCTURED CABLING SYSTEM PART NUMBERS -ACUTE SITE RENOVATION PROJECT WITH EXISTING CAT6 MER/TR, AND COMMUNITY SITE NEW CONSTRUCTION AND RENOVATION PROJECTS

Version 01

January 2020

CommScope Parts Version 01

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PHSA 1

CommScope Parts Version 01

### 1. Purpose

The purpose of this list of CommScope parts is to ensure all PHSA pre-approved Div.27 contractors provide the same products for healthcare facilities in BC when installing a CommScope structured cabling system solution and following the requirements of the latest PHSA Communications Infrastructure Standards & Specifications. If you are unable to provide the listed parts for your specific project, you must defer to PHSA for guidance.

### 2. Jack

.1 CAT6 RJ45 Jack... USL600

### 3. UTP Patch Panel

- .1 Patch Panel, 24-Port, Flat 1U (Preloaded Discreet Jacks)... 760237040
- .2 Patch Panel, 48-Port, Flat 2U (Preloaded Discreet Jacks)... 760237041
- .3 Patch Panel, 48-port, Flat 1U (Preloaded Discreet Jacks)... 760237054

### 4. Horizontal Cable

- .1 CAT6, Blue... CS37R (Riser)
- .2 CAT6, Blue... CS37P (Plenum)

### 5. UTP Patch Cord

- .1 CAT6 Patch Cord
  - .1 12" for Switches (small diameter)... CO166S2-03F001
  - .2 1.5m (5') (small diameter)... CO166S2-03F005
  - .3 2.1m (7') (small diameter)... CO166S2-03F007
  - .4 3m (10') (small diameter)... CO166S2-03F010
  - .5 3m (10') for Workstations... UC1BBB2-0CF010
  - .6 7.6m (25') for Wireless Access Point... UC1BBB2-0CF025
  - .7 9.1m (30') for Wireless Access Point... UC1BBB2-0CF030

## 6. CommScope Product Data Sheets

PHSA 2

# PHSA December 2019 C6 Copper (Uniprise)

SUBMITTED BY: CommScope DATE: December 16, 2019

ATTN: Kevin Wallingford E-mail: kevin.wallingford@commscope.com

### Cabinets, Panels and Enclosures

Copper Panels, Modules and Cassettes

	Part Number	Description	Quantity
27.55	760237040   CPP-UDDM-SL-1U-24	Discrete Distribution Module Panel, SL, UTP, 1U, 24 port	1
	760237041   CPP-UDDM-SL-2U-48	Discrete Distribution Module Panel, SL, UTP, 2U, 48 port	1
	760237054   UNP-UDDM-SL-1U-48	Discrete Distribution Module Panel, Cat6, UTP, 1U, 48 port	1

#### Cable Assemblies

Twisted Pair Cable Assemblies

	Part Number	Description	Quantity
	CO166S2-03F001   MINO6-DG-1FT	MiNo6 Series Category 6 Performance U/UTP Reduced Diameter LS-CM Dual Rated Patch Cord, Dark Gray Jacket	1
	CO166S2-03F005   MINO6-DG-5FT	MiNo6 Series Category 6 Performance U/UTP Reduced Diameter LS-CM Dual Rated Patch Cord, Dark Gray Jacket	1
	CO166S2-03F007   MINO6-DG-7FT	MiNo6 Series Category 6 Performance U/UTP Reduced Diameter LS-CM Dual Rated Patch Cord, Dark Gray Jacket	1
	CO166S2-03F010   MINO6-DG-10FT	MiNo6 Series Category 6 Performance U/UTP Reduced Diameter LS-CM Dual Rated Patch Cord, Dark Gray Jacket	1
4	UC1BBB2-0CF010   UNC6-GY-10FT	Uniprise Category 6 U/UTP Patch Cord, RJ45 to RJ45, 4-pair, Non-Plenum, Gray Jacket	1
1	UC1BBB2-0CF025   UNC6-GY-25FT	Uniprise Category 6 U/UTP Patch Cord, RJ45 to RJ45, 4-pair, Non-Plenum, Gray Jacket	1
4	UC1BBB2-0CF030   UNC6-GY-30FT	Uniprise Category 6 U/UTP Patch Cord, RJ45 to RJ45, 4-pair, Non-Plenum, Gray Jacket	1

#### Cables

#### Twisted Pair Cables

	Part Number	Description	Quantity
	UN874043014/10   CS37P BLU C6 4/23 U/UTP	CS37P ETL Verified Category 6 U/UTP Cable, plenum, blue jacket, 4 pair count,	1
	CPK 1KFT	1000 ft (305 m) length CommPak	
-	UN884026814/10   CS37R BLU C6 4/23 U/UTP	CS37R ETL Verified Category 6 U/UTP Cable, non-plenum, blue jacket, 4 pair	1
	CPK 1KFT	count, 1000 ft (305 m) length, CommPak	

#### Connectors

#### RJ45 Jacks

	Part Number	Description	Quantity
*		Uniprise USL Series Modular Jack, RJ45, category 6, T568A/T568B, unshielded, without dust cover, black	1

Faceplates and Boxes

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# PHSA December 2019 C6 Copper (Uniprise)

### Faceplates

	Part Number	Description	Quantity
11 40 11	1-2111011-3	Faceplate Kit, labeled, 1-gang, 4 port, alpine white	1
1 10			

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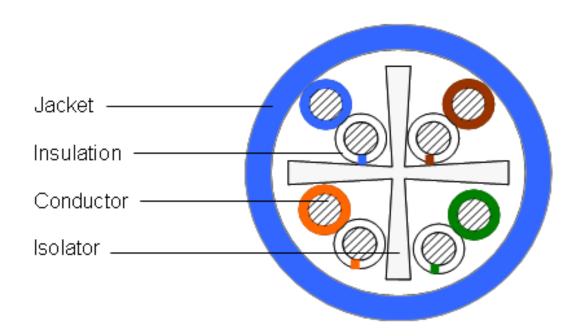
CS37P ETL Verified Category 6 U/UTP Cable, plenum, blue jacket, 4 pair count, 1000 ft (305 m) length CommPak

### **Product Classification**

Portfolio Uniprise®

Product TypeTwisted pair cableRegional AvailabilityNorth America

## Cross Section Drawing



### Construction Materials

**Jacket Material** PVC

Conductor MaterialBare copperInsulation MaterialFEP | Polyolefin

Separator Material FEP

### **Dimensions**

**Cable Length** 305 m | 1000 ft

Cable Weight 27.88 lb/kft

Diameter Over Jacket, nominal5.639 mm0.222 inJacket Thickness0.483 mm0.019 in

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### **Electrical Specifications**

ANSI/TIA Category 6

**Characteristic Impedance** 100 ohm **dc Resistance Unbalance, maximum** 5 %

**dc Resistance, maximum** 8.00 ohms/100 m

**Delay Skew, maximum** 45 ns

Dielectric Strength, minimum1500 Vac | 2500 VdcMutual Capacitance at Frequency5.6 nF/100 m @ 1 kHz

Nominal Velocity of Propagation (NVP) 75 %

Operating Frequency, maximum 400 MHz

Operating Voltage, maximum 80 V

**Remote Powering** Fully complies with the recommendations set forth by IEEE 802.3bt (Type 4) for the safe

delivery of power over LAN cable when installed according to ISO/IEC 14763-2, CENELEC EN

50174-1, CENELEC EN 50174-2 or TIA TSB-184-A

Transmission Standards ANSI/TIA-568-C.2 | CENELEC EN 50288-6-1 | ISO/IEC 11801 Class E

Safety Voltage Rating 300 V

Note All electrical transmission tests include swept frequency measurements

### **Environmental Specifications**

Environmental SpacePlenumSmoke Test MethodCMP

Flame Test Method CMP | NEC Article 800 | NFPA 262 | UL 444 | UL 910

Installation Temperature 0 °C to +60 °C (+32 °F to +140 °F) Operating Temperature -20 °C to +60 °C (-4 °F to +140 °F)

**Temperature Rating, UL** 75 °C | 167 °F

### General Specifications

Cable TypeU/UTP (unshielded)Packaging TypeCommPak® box

Pairs, quantity 4

Cable Component TypeHorizontalJacket ColorBlueProduct NumberCS37PConductor Gauge, singles23 AWGConductor Type, singlesSolidConductors, quantity8Separator TypeIsolator

## Mechanical Specifications

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Pulling Tension, maximum

11 kg | 25 lb

### Regulatory Compliance/Certifications

**Agency** Classification RoHS 2011/65/EU Compliant

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system





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### Electrical Performance

CS CommScope

Std Refers to the standard value listed under Transmission Standards in the Electrical Specifications above

Typ Typical

IL Insertion Loss (dB/100m)
NEXT Near End Crosstalk (dB/100m)

ACR Attenuation to Crosstalk Ratio (dB/100m)

PSNEXT Power Sum Near End Crosstalk (db/100m)

PSACR Power Sum Attenuation to Crosstalk Ratio (dB/100m)

ACRF Attenuation to Crosstalk Ratio - Far End (dB/100m)

PSACRF Power Sum Attenuation to Crosstalk Ratio – Far End (dB/100m)

RL Return Loss (dB)

Freq.		IL			NEXT			ACR		1	PSNEXT	Γ	PSACR				ACRF		PSACRF			RL		
MHz	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур
1	2.0	2.0	1.8	77.3	74.3	90.3	75.3	72.3	88.5	75.3	72.3	88.1	73.3	70.3	86.3	68.8	67.8	84.1	65.8	64.8	82.6	20.0	20.0	32.0
4	3.8	3.8	3.6	68.3	65.3	82.7	64.5	61.5	79.1	66.3	63.3	80.4	62.5	59.5	76.8	56.8	55.8	72.7	53.8	52.8	71.4	23.6	23.0	30.0
8	5.3	5.3	5.1	63.8	60.8	78.1	58.5	55.4	72.9	61.8	58.8	75.8	56.5	53.4	70.6	50.7	49.7	66.9	47.7	46.7	65.5	25.4	24.5	34.3
10	5.9	6.0	5.8	62.3	59.3	76.5	56.4	53.3	70.7	60.3	57.3	74.3	54.4	51.3	68.5	48.8	47.8	65.0	45.8	44.8	63.6	26.0	25.0	34.9
16	7.5	7.6	7.3	59.2	56.2	73.5	51.7	48.7	66.1	57.2	54.2	71.3	49.7	46.7	64.0	44.7	43.7	61.0	41.7	40.7	59.5	26.0	25.0	35.2
20	8.4	8.5	8.2	57.8	54.8	72.0	49.4	46.3	63.8	55.8	52.8	69.8	47.4	44.3	61.6	42.8	41.8	59.0	39.8	38.8	57.6	26.0	25.0	35.0
25	9.4	9.5	9.2	56.3	53.3	70.3	46.9	43.8	61.0	54.3	51.3	68.2	44.9	41.8	58.9	40.8	39.8	57.1	37.8	36.8	55.7	25.3	24.3	36.1
31.25	10.6	10.7	10.3	54.9	51.9	68.9	44.3	41.2	58.6	52.9	49.9	66.8	42.3	39.2	56.5	38.9	37.9	55.2	35.9	34.9	53.8	24.6	23.6	36.4
62.5	15.3	15.4	14.8	50.4	47.4	63.8	35.1	32.0	49.0	48.4	45.4	61.7	33.1	30.0	46.8	32.9	31.9	49.0	29.9	28.9	47.6	22.5	21.5	34.1
100	19.7	19.8	19.0	47.3	44.3	60.5	27.6	24.5	41.6	45.3	42.3	58.3	25.6	22.5	39.3	28.8	27.8	44.7	25.8	24.8	43.3	21.1	20.1	32.4
155	25.0	25.2	23.9	44.4	41.4	58.6	19.5	16.3	34.7	42.4	39.4	56.3	17.5	14.3	32.4	25.0	24.0	41.3	22.0	21.0	39.8	19.8	18.8	30.0
200	28.8	29.0	27.4	42.8	39.8	55.4	14.0	10.8	28.0	40.8	37.8	53.3	12.0	8.8	26.0	22.8	21.8	38.5	19.8	18.8	37.1	19.0	18.0	29.3
250	32.6	32.8	30.8	41.3	38.3	54.0	8.7	5.5	23.2	39.3	36.3	51.9	6.7	3.5	21.0	20.8	19.8	36.5	17.8	16.8	35.0	18.3	17.3	28.3
300	36.2		34.0	40.1		52.2	4.0		18.2	38.1		50.2	2.0		16.2	19.3		34.6	16.3		33.1	17.8		28.2
350	39.5		37.0	39.1		50.9	-0.4		14.0	37.1		48.9	-2.4		12.0	17.9		33.0	14.9		31.4	17.3		28.1
400	42.7		39.7	38.3		49.9	-4.4		10.2	36.3		47.9	-6.4		8.2	16.8		30.9	13.8		29.4	16.9		28.6
500			44.9			48.0			3.1			45.9			1.0			26.9			25.2			28.7
550			45.2			47.5			2.3			45.5			0.3			26.9			25.2			28.5
650			49.8			46.4			-3.5			44.2			-5.6			23.3			21.5			25.3







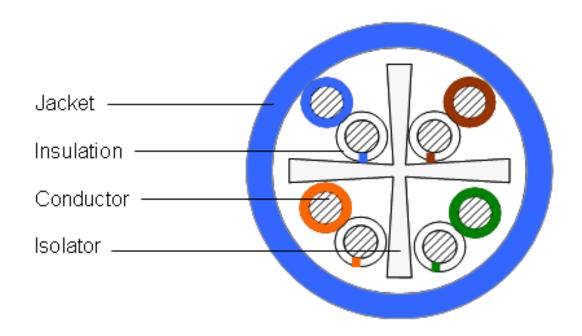
CS37R ETL Verified Category 6 U/UTP Cable, non-plenum, blue jacket, 4 pair count, 1000 ft (305 m) length, CommPak

### **Product Classification**

Portfolio Uniprise®

Product TypeTwisted pair cableRegional AvailabilityNorth America

## Cross Section Drawing



### Construction Materials

**Jacket Material** PVC

Conductor MaterialBare copperInsulation MaterialPolyolefinSeparator MaterialPolyolefin

### **Dimensions**

**Cable Length** 305 m | 1000 ft

Cable Weight 24.62 lb/kft

Diameter Over Jacket, nominal5.766 mm0.227 inJacket Thickness0.508 mm0.020 in

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### **Electrical Specifications**

ANSI/TIA Category 6

**Characteristic Impedance** 100 ohm dc Resistance Unbalance, maximum 5 %

**dc Resistance, maximum** 8.00 ohms/100 m

**Delay Skew, maximum** 45 ns

Dielectric Strength, minimum1500 Vac | 2500 VdcMutual Capacitance at Frequency5.6 nF/100 m @ 1 kHz

Nominal Velocity of Propagation (NVP) 69 %
Operating Frequency, maximum 400 MHz
Operating Voltage, maximum 80 V

**Remote Powering** Fully complies with the recommendations set forth by IEEE 802.3bt (Type 4) for the safe

delivery of power over LAN cable when installed according to ISO/IEC 14763-2, CENELEC EN

50174-1, CENELEC EN 50174-2 or TIA TSB-184-A

**Transmission Standards** ANSI/TIA-568-C.2 | CENELEC EN 50288-6-1 | ISO/IEC 11801 Class E

Safety Voltage Rating 300 V

Note All electrical transmission tests include swept frequency measurements

### **Environmental Specifications**

Environmental Space Non-plenum

Flame Test Method CMR | NEC Article 800 | UL 1666 | UL 444

Installation Temperature 0 °C to +60 °C ( +32 °F to +140 °F)Operating Temperature -20 °C to +60 °C ( -4 °F to +140 °F)

**Temperature Rating, UL** 75 °C | 167 °F

### General Specifications

 Cable Type
 U/UTP (unshielded)

 Packaging Type
 CommPak® box

Pairs, quantity

Cable Component TypeHorizontalJacket ColorBlueProduct NumberCS37RConductor Gauge, singles23 AWGConductor Type, singlesSolidConductors, quantity8Separator TypeIsolator

### Mechanical Specifications

**Pulling Tension, maximum** 11 kg | 25 lb

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## Regulatory Compliance/Certifications

**Agency** RoHS 2011/65/EU

Classification

Compliant ISO 9001:2015

Designed, manufactured and/or distributed under this quality management system





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### Electrical Performance

CS CommScope

Std Refers to the standard value listed under Transmission Standards in the Electrical Specifications above

Typ Typical

IL Insertion Loss (dB/100m)

NEXT Near End Crosstalk (dB/100m)

ACR Attenuation to Crosstalk Ratio (dB/100m)

PSNEXT Power Sum Near End Crosstalk (db/100m)

PSACR Power Sum Attenuation to Crosstalk Ratio (dB/100m)

ACRF Attenuation to Crosstalk Ratio - Far End (dB/100m)

PSACRF Power Sum Attenuation to Crosstalk Ratio - Far End (dB/100m)

RL Return Loss (dB)

Freq.		IL			NEXT			ACR			PSNEXT			PSACR			ACRF		PSACRF				RL	
MHz	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур	cs	Std	Тур
1	2.0	2.0	1.8	77.3	74.3	90.3	75.3	72.3	88.5	75.3	72.3	88.1	73.3	70.3	86.3	68.8	67.8	84.1	65.8	64.8	82.6	20.0	20.0	32.0
4	3.8	3.8	3.6	68.3	65.3	82.7	64.5	61.5	79.1	66.3	63.3	80.4	62.5	59.5	76.8	56.8	55.8	72.7	53.8	52.8	71.4	23.6	23.0	30.0
8	5.3	5.3	5.1	63.8	60.8	78.1	58.5	55.4	72.9	61.8	58.8	75.8	56.5	53.4	70.6	50.7	49.7	66.9	47.7	46.7	65.5	25.4	24.5	34.3
10	5.9	6.0	5.8	62.3	59.3	76.5	56.4	53.3	70.7	60.3	57.3	74.3	54.4	51.3	68.5	48.8	47.8	65.0	45.8	44.8	63.6	26.0	25.0	34.9
16	7.5	7.6	7.3	59.2	56.2	73.5	51.7	48.7	66.1	57.2	54.2	71.3	49.7	46.7	64.0	44.7	43.7	61.0	41.7	40.7	59.5	26.0	25.0	35.2
20	8.4	8.5	8.2	57.8	54.8	72.0	49.4	46.3	63.8	55.8	52.8	69.8	47.4	44.3	61.6	42.8	41.8	59.0	39.8	38.8	57.6	26.0	25.0	35.0
25	9.4	9.5	9.2	56.3	53.3	70.3	46.9	43.8	61.0	54.3	51.3	68.2	44.9	41.8	58.9	40.8	39.8	57.1	37.8	36.8	55.7	25.3	24.3	36.1
31.25	10.6	10.7	10.3	54.9	51.9	68.9	44.3	41.2	58.6	52.9	49.9	66.8	42.3	39.2	56.5	38.9	37.9	55.2	35.9	34.9	53.8	24.6	23.6	36.4
62.5	15.3	15.4	14.8	50.4	47.4	63.8	35.1	32.0	49.0	48.4	45.4	61.7	33.1	30.0	46.8	32.9	31.9	49.0	29.9	28.9	47.6	22.5	21.5	34.1
100	19.7	19.8	19.0	47.3	44.3	60.5	27.6	24.5	41.6	45.3	42.3	58.3	25.6	22.5	39.3	28.8	27.8	44.7	25.8	24.8	43.3	21.1	20.1	32.4
155	25.0	25.2	23.9	44.4	41.4	58.6	19.5	16.3	34.7	42.4	39.4	56.3	17.5	14.3	32.4	25.0	24.0	41.3	22.0	21.0	39.8	19.8	18.8	30.0
200	28.8	29.0	27.4	42.8	39.8	55.4	14.0	10.8	28.0	40.8	37.8	53.3	12.0	8.8	26.0	22.8	21.8	38.5	19.8	18.8	37.1	19.0	18.0	29.3
250	32.6	32.8	30.8	41.3	38.3	54.0	8.7	5.5	23.2	39.3	36.3	51.9	6.7	3.5	21.0	20.8	19.8	36.5	17.8	16.8	35.0	18.3	17.3	28.3
300	36.2		34.0	40.1		52.2	4.0		18.2	38.1		50.2	2.0		16.2	19.3		34.6	16.3		33.1	17.8		28.2
350	39.5		37.0	39.1		50.9	-0.4		14.0	37.1		48.9	-2.4		12.0	17.9		33.0	14.9		31.4	17.3		28.1
400	42.7		39.7	38.3		49.9	-4.4		10.2	36.3		47.9	-6.4		8.2	16.8		30.9	13.8		29.4	16.9		28.6
500			45.2			47.5			2.3			45.5			0.3			26.9			25.2			28.5
550			44.9			50.9			6.0			48.8			3.9			28.7			27.3			33.6
650			49.8			46.4			-3.5			44.2			-5.6			23.3			21.5			25.3





### 760237627 | USL600-BLK



Uniprise USL Series Modular Jack, RJ45, category 6, T568A/T568B, unshielded, without dust cover, black

### **Product Classification**

PortfolioUniprise®Product SeriesUSL SeriesProduct TypeModular jackRegional AvailabilityNorth America

### **Electrical Specifications**

ANSI/TIA Category 6

Contact Resistance Variation, maximum20 mOhmContact Resistance, maximum100 mOhm

Current Rating at Temperature 1.5 A @ 20 °C | 1.5 A @ 68 °F

**Dielectric Withstand Voltage, RMS, conductive surface** 1,500 Vac @ 60 Hz **Dielectric Withstand Voltage, RMS, contact-to-contact** 1,000 Vac @ 60 Hz

**Insulation Resistance, minimum** 500 MOhm

### **Environmental Specifications**

Flammability Rating UL 94 V-0

Operating Temperature -10 °C to +60 °C (+14 °F to +140 °F)

**Relative Humidity**Up to 95%, non-condensing

Safety Standard CUL | UL

**Storage Temperature**  $-40 \,^{\circ}\text{C}$  to  $+70 \,^{\circ}\text{C}$  (-40 °F to  $+158 \,^{\circ}\text{F}$ )

### General Specifications

Cable TypeUnshieldedColorBlackPackage Quantity1

### Mechanical Specifications

Conductor Gauge, solid 22 AWG | 24 AWG

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## 760237627 | USL600-BLK

Conductor Gauge, stranded24 AWG | 26 AWGConductor TypeSolid | Stranded

Contact Plating Material Precious metals

Material Type Copper alloy | High-impact, flame retardant, thermoplastic

**Plug Insertion Life, minimum** 750 times

**Plug Insertion Life, test plug**IEC 60603-7 compliant plug

Plug Retention Force, minimum 133 N | 30 lbf

Termination Contact Plating Nickel
Termination Type IDC

**Wiring** T568A | T568B

### Regulatory Compliance/Certifications

Agency Classification

RoHS 2011/65/EU

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system





## 760237040 | CPP-UDDM-SL-1U-24



### Discrete Distribution Module Panel, SL, UTP, 1U, 24 port

#### **Product Classification**

PortfolioCommScope®Product TypeRJ45 patch panel

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

### **Dimensions**

Depth, with cable management119.38 mm4.70 inDiameter Over Dielectric, maximum1.168 mm0.046 inDiameter Over Dielectric, minimum0.762 mm0.030 inHeight44.45 mm1.75 inWidth482.60 mm19.00 in

### **Electrical Specifications**

ANSI/TIA Category 5e | 6 | 6A

### **Environmental Specifications**

Flammability Rating UL 94 V-0

**Operating Temperature**  $-10 \, ^{\circ}\text{C}$  to  $+60 \, ^{\circ}\text{C}$  (+14  $^{\circ}\text{F}$  to +140  $^{\circ}\text{F}$ )

Safety Standard CUL | RCM | UL

**Storage Temperature** -40 °C to +70 °C (-40 °F to +158 °F)

## General Specifications

Total Ports, quantity 24

Cable TypeUnshieldedColorBlackModules, quantity0Package Quantity1

Rack Type EIA 19 in Rack Units 1.0

### Mechanical Specifications

Panel Style Straight

Material Type High-impact, flame retardant, thermoplastic | Powder-coated steel

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## 760237040 | CPP-UDDM-SL-1U-24

## Regulatory Compliance/Certifications

AgencyClassificationROHS 2011/65/EUCompliant

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system





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## 760237041 | CPP-UDDM-SL-2U-48



### Discrete Distribution Module Panel, SL, UTP, 2U, 48 port

### **Product Classification**

PortfolioCommScope®Product TypeRJ45 patch panel

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

### **Dimensions**

Depth, with cable management119.38 mm4.70 inDiameter Over Dielectric, maximum1.168 mm0.046 inDiameter Over Dielectric, minimum0.762 mm0.030 inHeight88.90 mm3.50 inWidth482.60 mm19.00 in

### **Electrical Specifications**

ANSI/TIA Category 5e | 6 | 6A

### **Environmental Specifications**

Flammability Rating UL 94 V-0

**Operating Temperature**  $-10 \, ^{\circ}\text{C} \text{ to } +60 \, ^{\circ}\text{C} \text{ (+14 } ^{\circ}\text{F to } +140 \, ^{\circ}\text{F)}$ 

Safety Standard CUL | RCM | UL

**Storage Temperature** -40 °C to +70 °C (-40 °F to +158 °F)

## General Specifications

Total Ports, quantity 48

Cable TypeUnshieldedColorBlackModules, quantity0Package Quantity1

Rack Type EIA 19 in Rack Units 2.0

### Mechanical Specifications

Panel Style Straight

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## 760237041 | CPP-UDDM-SL-2U-48

**Material Type** 

High-impact, flame retardant, thermoplastic | Powder-coated steel

## Regulatory Compliance/Certifications

Classification **Agency** RoHS 2011/65/EU Compliant

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system





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### Discrete Distribution Module Panel, Cat6, UTP, 1U, 48 port



### **Product Classification**

PortfolioUniprise®Product TypeRJ45 patch panelRegional AvailabilityNorth America

### **Dimensions**

 Depth, with cable management
 93.98 mm | 3.70 in

 Diameter Over Dielectric, maximum
 1.168 mm | 0.046 in

 Diameter Over Dielectric, minimum
 0.762 mm | 0.030 in

 Height
 44.45 mm | 1.75 in

 Width
 482.60 mm | 19.00 in

### **Electrical Specifications**

ANSI/TIA Category

Current Rating at Temperature 1.5 A @ 20 °C | 1.5 A @ 68 °F

**Dielectric Withstand Voltage, RMS, conductive surface** 1,500 Vac @ 60 Hz **Dielectric Withstand Voltage, RMS, contact-to-contact** 1,000 Vac @ 60 Hz

**Insulation Resistance, minimum** 500 MOhm

### **Environmental Specifications**

Flammability Rating UL 94 V-0

**Operating Temperature**  $-10 \, ^{\circ}\text{C} \text{ to } +60 \, ^{\circ}\text{C} \text{ (+14 } ^{\circ}\text{F to } +140 \, ^{\circ}\text{F)}$ 

**Relative Humidity** Up to 95%, non-condensing

Safety Standard CUL | UL

**Storage Temperature** -40 °C to +70 °C (-40 °F to +158 °F)

### General Specifications

Total Ports, quantity 48

Cable TypeUnshieldedColorBlack

**Includes** Modular jacks (48)

Modules, quantity 4
Package Quantity 1

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## 760237054 | UNP-UDDM-SL-1U-48

Rack TypeEIA 19 inRack Units1.0

Mechanical Specifications

Panel Style Straight

Material Type High-impact, flame retardant, thermoplastic | Powder-coated steel

**Wiring** T568A | T568B

### Regulatory Compliance/Certifications

Agency Classification

RoHS 2011/65/EU

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system





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### Faceplate Kit, labeled, 1-gang, 4 port, alpine white

- Engineered for residential and commercial applications from classrooms and hospitals to offices and homes
- Labeling models feature mold-over icon and leveling and convex labels for maximum visibility in low density areas
- Wide range of port configurations, including single gang in 1-, 2-, 3-, 4- and 6-port and double gang in 6-, 8- and 12-port

### **Product Classification**

Portfolio NETCONNECT®
Product Type Faceplate kit

Regional Availability Australia/New Zealand | EMEA | Latin America | North America

### General Specifications

**Color** Alpine white

Mount Type Flush
Total Ports, quantity 4

**Application** Used with SL Series outlets

Gangs, quantity 1

Includes Faceplate (1) | Label (2) | Label cover (2) | Mounting screw (2)

Package Quantity 1
Packaging Type Bag

Port Marking Type Label | Icon

#### Dimensions

 Depth
 5.59 mm | 0.22 in

 Height
 114.30 mm | 4.50 in

 Width
 69.85 mm | 2.75 in

### Mechanical Specifications

Material Type High-impact, flame retardant, thermoplastic

Outlet Orientation Flat

### **Environmental Specifications**

Qualification Standards IEC 60603-7-1:2011

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## 1-2111011-3

## Regulatory Compliance/Certifications

**Agency** 

RoHS 2011/65/EU

Classification

Compliant



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### CO166S2-03 | MINO6-DG



# MiNo6 Series Category 6 Performance U/UTP Reduced Diameter LS-CM Dual Rated Patch Cord, Dark Gray Jacket

- Perfect for cross connects, workstations or racks with higher-density and/or limited space
- Small diameter unshielded twisted pair patch cords (0.195 inch/4.95 mm) that offers flexibility, durability and reliability
- Unique laminate barrier wrap provides excellent alien cross-talk performance

#### Product Classification

Portfolio CommScope®

**Product Type** Twisted pair patch cord

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

### **Dimensions**

Cord Length, maximum 10 m | 33 ft Cord Length, minimum 1 m | 3 ft

**Diameter Over Jacket** 3.81 mm | 0.15 in

### **Electrical Specifications**

**ANSI/TIA Category** 6 (except wire gauge)

dc Resistance, maximum0.30 ohmSafety Voltage Rating300 V

### **Environmental Specifications**

**Environmental Space** Low Smoke Zero Halogen (LSZH) | Non-plenum

Flammability Rating UL 94 V-0

**Operating Temperature**  $-10 \,^{\circ}\text{C}$  to  $+60 \,^{\circ}\text{C}$  (+14 °F to +140 °F)

Safety Standard CETL | ETL

### General Specifications

Cable TypeU/UTP (unshielded)

Interface, connector ARJ45 plugInterface, connector BRJ45 plugJacket ColorDark grayInterface Feature, connector AStandardInterface Feature, connector BStandardPackage Quantity1

Pairs, quantity 4



## CO166S2-03 | MINO6-DG

### Mechanical Specifications

Conductor TypeStrandedContact Plating MaterialPrecious metals

Material Type Copper alloy | Polycarbonate

Plug Insertion Life, minimum 750 times
Plug Retention Force, minimum 90 N | 20 lbf

Wiring T568B

## Wiring Diagram

	Connector A	Connector B
Position 1	White/Orange	White/Orange
Position 2	Orange	Orange
Position 3	Lt. Green	Lt. Green
Position 4	Blue	Blue
Position 5	Lt. Blue	Lt. Blue
Position 6	Green	Green
Position 7	Lt. Brown	Lt. Brown
Position 8	Brown	Brown

### Regulatory Compliance/Certifications

**Agency** Classification RoHS 2011/65/EU Compliant

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system





### Included Products

CC884011444/BU | CCM6CMZH DGY 4/28 SR U/UTP RL BULK (Product Component—not orderable) — CCM6CMZH Category 6 U/UTP Cable, LSZH, dark gray jacket, 4 pair count, bulk length, reel

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## UC1BBB2-OC | UNC6-GY



Uniprise Category 6 U/UTP Patch Cord, RJ45 to RJ45, 4-pair, Non-Plenum, Gray Jacket

### **Product Classification**

Portfolio Uniprise®

**Product Type** Twisted pair patch cord

Regional Availability North America

### **Dimensions**

Cord Length, maximum 100 ft | 30 m Cord Length, minimum 1 ft | 1 m

### **Electrical Specifications**

ANSI/TIA Category 6

dc Resistance, maximum0.30 ohmSafety Voltage Rating300 V

### **Environmental Specifications**

**Environmental Space** Non-plenum **Flammability Rating** UL 94 V-0

**Operating Temperature**  $-10 \, ^{\circ}\text{C}$  to  $+60 \, ^{\circ}\text{C}$  (+14  $^{\circ}\text{F}$  to +140  $^{\circ}\text{F}$ )

Safety Standard CETL | ETL

### General Specifications

Cable Type U/UTP (unshielded)

Interface, connector ARJ45 plugInterface, connector BRJ45 plugJacket ColorGrayInterface Feature, connector AStandardInterface Feature, connector BStandard

Package Quantity 1
Pairs, quantity 4

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### UC1BBB2-OC | UNC6-GY

### Mechanical Specifications

Conductor TypeStrandedContact Plating MaterialPrecious metals

Material Type Copper alloy | Polycarbonate

Plug Insertion Life, minimum 750 times
Plug Retention Force, minimum 133 N | 30 lbf

Wiring T568B

## Wiring Diagram

	Connector A	Connector B
Position 1	White/Orange	White/Orange
Position 2	Orange	Orange
Position 3	Lt. Green	Lt. Green
Position 4	Blue	Blue
Position 5	Lt. Blue	Lt. Blue
Position 6	Green	Green
Position 7	Lt. Brown	Lt. Brown
Position 8	Brown	Brown

### Regulatory Compliance/Certifications

**Agency** Classification RoHS 2011/65/EU Compliant

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system





### Included Products

CC8869444/BU | CC6CM GRY 4/24 SR U/UTP RL BULK (Product Component—not orderable) — CC6CM Category 6 U/UTP Cable, non-plenum, gray jacket, 4 pair count, bulk length, reel

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# APPENDIX D.3: COMMSCOPE SYSTIMAX CAT6A STRUCTURED CABLING SYSTEM PART NUMBERS

# ACUTE SITE NEW CONSTRUCTION PROJECT AND RENOVATION PROJECT WITH NEW MER/TR

Version 01

January 2022

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CommScope Parts	Version
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PHSA 2

CommScope Parts Version 01

#### 1. Purpose

The purpose of this list of CommScope parts is to ensure all PHSA pre-approved Div.27 contractors provide the same products for healthcare facilities in BC when installing CommScope structured cabling system solution and following the requirements of the latest PHSA Communications Infrastructure Standards & Specifications. If you are unable to provide the listed parts for your specific project, you must defer to PHSA for guidance.

### 2. Faceplate

- .1 Flush-mount Faceplate; 4-port M14L-262
- .2 Wall Mount Phone Plate; 1-port, (recessed port), Single Gang M10LW4SP
- .3 Furniture Faceplate Furniture Faceplate, 4-port M14C-XXX
- .4 2-Port White Surface Mount Box M102SMB-B-262

#### 3. Jack

- .1 CAT6A Jack (field)... MGS600-003
- .2 CAT6A Jack (patch panel)... HGS620

#### 4. UTP Patch Panel

- .1 10G Patch Panel, 24-Port, Flat 1U (Preloaded Discreet Jacks)... 760150144
- .2 10G Patch Panel, 48-Port, Flat 2U (Preloaded Discreet Jacks)... 760151498
- .3 10G Patch Panel, 48-Port, Flat 1U (Preloaded Discreet Jacks)... 760237066

#### 5. Horizontal Cable

.1 CAT6A 10G (small diameter), Blue... 1091B (Riser) 2091B (Plenum) – 0.285" OD

#### 6. UTP Patch Cord

- .1 CAT6A Patch Cord
  - .1 12" 28 AWG stranded (small diameter) for switches... CO199K2-03F001
  - .2 1.5m (5') (small diameter) ... CO199K2-03F005
  - .3 2.1m (7') (small diameter) ... CO199K2-03F007
  - .4 3m (10') (small diameter)... CO199K2-03F010
  - .5 3m (10') for Workstations... CPCSSX2-03F010
  - .6 7.6m (25') for Wireless Access Point... CPCSSX2-03F025
  - .7 9.1m (30') for Wireless Access Point... CPCSSX2-03F030

## 7. Vertical and Horizontal Managers

- .1 Vertical Managers
  - .1 VCM-DS-84-10 10" x 7' (254mm x 2.1m) VCM kit, with Silver door
  - .2 VCM-DS-84-6 6" x 7' (152mm x 2.1m) VCM kit, with Silver door
    - .1 Use the 10" W x 22" D product between the Racks and the 6" W x 22" D product at the ends of the Racks
- .2 Horizontal Managers
  - .1 HTK-19-SS-2U 760072959 2U high single-sided cable management kit

PHSA 3

CommScope Parts Version 01

## 8. CommScope Product Data Sheets

PHSA 4

SUBMITTED BY: CommScope DATE: 01/07/2022

ATTN: Kevin Wallingford **E-mail:** Kevin.Wallingford@commscope.com

#### Category 6A Cables

	Part Number   Name	Description	Comment	Quantity
7	4/23 U/UTP W1000	GigaSPEED X10D® 1091B ETL Verified Category 6A U/UTP Cable, blue jacket, 4 pair count, 1000 ft (305 m) length, WE TOTE® box		1
>	4/23 U/UTP W1000	GigaSPEED X10D® 2091B ETL Verified Category 6A U/UTP Cable, blue jacket, 4 pair count, 1000 ft (305 m) length, WE TOTE® box		1

#### Category 6A Jacks

Part Number   Name	Description	Comment	Quantity
760092361   MGS600-003	GigaSPEED X10D® MGS600 Series Information Outlet, black		1
760152801   HGS620	GigaSPEED X10D® HGS620 Shielded High Density Information Outlet		1

#### Copper Panels

Part Number   Name	Description	Comment	Quantity
	SYSTIMAX 360™ GigaSPEED X10D® Evolve High Density Shielded Modular Panel, 24 port		1

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	Part Number   Name	Description	Comment	Quantity
S. S	760151498   360-IPR-MFTP-E- HD6B-2U-48	SYSTIMAX 360™ GigaSPEED X10D® Evolve High Density Shielded Modular Panel, 48 port		1
	760237066   CPP-6A-SDDM-SL- 1U-48	Discrete Distribution Module Panel, Cat 6A, SL, STP, 1U, 48 port		1

#### **Faceplates**

	Part Number   Name	Description	Comment	Quantity
77.11	108333162   M14LE-262	LE Type Flush Mounted Faceplate, four port white		1
	760100891   M10LW4SP	M10LW4SP 1-port Single Gang Stainless Steel Telephone Faceplate, 4.00 in lug spacing		1
	760118232   M14CE-E -262 Faceplate 0.08 Snap	M14CE-E Type Furniture Faceplate, four port white		1

### Horizontal & Vertical Cable Managers

Part Number   Name	Description	Comment	Quantity
760072785   VCM-DS-84-6	Vertical Cable Management Kit, 6in X 84in (152mm X 2134mm) Double Sided, With Doors, Silver		1

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	Part Number   Name	Description	Comment	Quantity
	760072801   VCM-DS-84-10	Vertical Cable Management Kit, 10in X 84in (254mm X 2134mm) Double Sided, With Doors, Silver		1
(mmm)	760072959   HTK-19-SS-2U	Horizontal Trough Kit, 2 RU, 19 in, single sided		1

#### Surface Mount & Zone Boxes

	Part Number   Name	Description	Comment	Quantity
THE .	107984056   M102SMB-B-262	M102 Type Surface Mount Box, dual port white		1

#### Twisted Pair Patch Cords

	Part Number   Name	Description	Comment	Quantity
Said Said	CO199K2-03F001	MiNo6A Series Category 6A U/UTP Reduced Diameter LS-CM Dual Rated Cord, 3 - Dark Gray, 1, ft		1
	CO199K2-03F005	MiNo6A Series Category 6A U/UTP Reduced Diameter LS-CM Dual Rated Cord, 3 - Dark Gray, 5, ft		1
gird (	CO199K2-03F007	MiNo6A Series Category 6A U/UTP Reduced Diameter LS-CM Dual Rated Cord, 3 - Dark Gray, 7, ft		1

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Part Number   Name	Description	Comment	Quantity
CO199K2-03F010	MiNo6A Series Category 6A U/UTP Reduced Diameter LS-CM Dual Rated Cord, 3 - Dark Gray, 10, ft		1
CPCSSX2-03F010	GigaSPEED X10D® 360GS10E Solid Cordage Modular Patch Cord, 3 - Dark Gray, 10, ft		1
CPCSSX2-03F025	GigaSPEED X10D® 360GS10E Solid Cordage Modular Patch Cord, 3 - Dark Gray, 25, ft		1
CPCSSX2-03F030	GigaSPEED X10D® 360GS10E Solid Cordage Modular Patch Cord, 3 - Dark Gray, 30, ft		1

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## 107984056 | M102SMB-B-262



### M102 Type Surface Mount Box, dual port white

### **Product Classification**

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio CommScope®

Product Type Surface mount box

### General Specifications

**Application** Used with one or two M Series modular information outlet

Color White

Mounting Surface

Total Ports, quantity 2

#### **Dimensions**

 Height
 57.4 mm | 2.26 in

 Width
 52.32 mm | 2.06 in

 Depth
 32.77 mm | 1.29 in

## Material Specifications

Material Type High-impact, flame retardant, thermoplastic

### **Environmental Specifications**

Flammability Rating UL 94 V-0

Safety Standard UL | cUL

## Packaging and Weights

Packaging quantity 1

**Weight, net** 0.05 kg | 0.11 lb

## Regulatory Compliance/Certifications

Agency Classification

COMMSCOPE°

# 107984056 | M102SMB-B-262

ISO 9001:2015 REACH-SVHC

ROHS



Designed, manufactured and/or distributed under this quality management system Compliant as per SVHC revision on www.commscope.com/ProductCompliance Compliant

## 108333162 | M14LE-262



## LE Type Flush Mounted Faceplate, four port white

• Available for use with the DYMO® labeling solution

#### **OBSOLETE**

This product was discontinued on: May 29, 2020

Replaced By:

108168543 M14L-262

L Type Flush Mounted Faceplate, four port white

#### **Product Classification**

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio CommScope®
Product Type Faceplate kit

## General Specifications

**Application** Used with M Series modular information outlet

ColorWhiteMountingFlushTotal Ports, quantity4

### Dimensions

 Height
 122.174 mm | 4.81 in

 Width
 72.136 mm | 2.84 in

 Depth
 8.382 mm | 0.33 in

## Material Specifications

Material Type High-impact, flame retardant, thermoplastic



## 108333162 | M14LE-262

## **Environmental Specifications**

Flammability Rating UL 94 V-0

Safety Standard UL | cUL

### Packaging and Weights

Packaging quantity

**Weight, net** 0.036 kg | 0.08 lb

## Regulatory Compliance/Certifications

#### Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system
REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant





## 760100891 | M10LW4SP



M10LW4SP 1-port Single Gang Stainless Steel Telephone Faceplate, 4.00 in lug spacing

### **Product Classification**

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio CommScope®
Product Type Faceplate kit

### General Specifications

**Application** Used with M Series modular information outlet

Mounting Flush

Total Ports, quantity 1

#### **Dimensions**

 Height
 115.824 mm | 4.56 in

 Width
 71.374 mm | 2.81 in

 Depth
 7.366 mm | 0.29 in

## Material Specifications

Material Type Stainless steel

## **Environmental Specifications**

Safety Standard UL

## Packaging and Weights

Packaging quantity 1

## Regulatory Compliance/Certifications

Agency Classification

COMMSCOPE®

# 760100891 | M10LW4SP

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

Compliant



ROHS



# 760118232 | M14CE-E -262 Faceplate 0.08 Snap



### M14CE-E Type Furniture Faceplate, four port white

#### **Product Classification**

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio CommScope®
Product Type Faceplate kit

### General Specifications

**Application** Fit the modular furniture raceway | Hold M Series modular outlets

Color White
Mounting Flush
Total Ports, quantity 4

#### Dimensions

 Height
 55.88 mm | 2.2 in

 Width
 103.886 mm | 4.09 in

 Depth
 40.64 mm | 1.6 in

### Material Specifications

Material Type High-impact, flame retardant, thermoplastic

## **Environmental Specifications**

Flammability Rating UL 94 V-0

Safety Standard UL | cUL

## Packaging and Weights

Packaging quantity 1

**Weight, net** 0.064 kg | 0.14 lb

## Regulatory Compliance/Certifications

Agency Classification

**COMMSCOPE®** 

# 760118232 | M14CE-E -262 Faceplate 0.08 Snap

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant





Vertical Cable Management Kit, 6in X 84in (152mm X 2134mm) Double Sided, With Doors, Silver

#### **OBSOLETE**

This product was discontinued on: January 31, 2020

Replaced By:

760244775 VCM-DS-84-6

Vertical Cable Management Kit, 6in X 84in (152mm X 2134mm) Double Sided, With Doors, Silver

#### **Product Classification**

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio CommScope®

Product Type Vertical cable management

## General Specifications

Configuration Type Double-sided

**Color** Silver

Door, quantity 2

#### Dimensions

 Height
 2,133.6 mm | 84 in

 Width
 152.4 mm | 6 in

 Depth
 558.8 mm | 22 in

## Material Specifications

**Finish** Powder-coated, smooth

Material Type Aluminum



## **Environmental Specifications**

Safety Standard UL | cUL

Packaging and Weights

**Included** Four 1/2-20 hex nuts | Four 1/2-20 x 1 in hex head bolts | Four flat washers | Instruction sheet

Packaging quantity 1

Packaging Type Assembled

### Regulatory Compliance/Certifications

Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant







Vertical Cable Management Kit, 10in X 84in (254mm X 2134mm) Double Sided, With Doors, Silver

#### **OBSOLETE**

This product was discontinued on: January 31, 2020

Replaced By:

760244777 VCM-DS-84-10

Vertical Cable Management Kit, 10in X 84in (254mm X 2134mm) Double Sided, With Doors, Silver

#### **Product Classification**

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio CommScope®

Product Type Vertical cable management

## General Specifications

Configuration Type Double-sided

**Color** Silver

Door, quantity 2

#### Dimensions

 Height
 2,133.6 mm | 84 in

 Width
 254 mm | 10 in

**Depth** 558.8 mm | 22 in

## Material Specifications

**Finish** Powder-coated, smooth

Material Type Aluminum



## **Environmental Specifications**

Safety Standard UL | cUL

Packaging and Weights

Included Four 1/2-20 hex nuts | Four 1/2-20 x 1 in hex head bolts | Four flat washers | Instruction

sheet | Two spools

Packaging quantity 1

Packaging Type Assembled

Regulatory Compliance/Certifications

Agency Classification

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant



#### Included Products

760073007 - Cable Management Spool, 2 Spools

CABLE-MGT-SP



## 760072959 | HTK-19-SS-2U



### Horizontal Trough Kit, 2 RU, 19 in, single sided

#### **Product Classification**

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio CommScope®

Product Type Horizontal cable management

General Specifications

**Color** Black

Rack Units 2

**Dimensions** 

**Width** 482.6 mm | 19 in

Material Specifications

**Finish** Powder-coated, smooth

Material Type Aluminum | Steel

**Environmental Specifications** 

Safety Standard UL | cUL

Packaging and Weights

**Included** Four #12-24 x 1/2 in screws | Instruction sheet

Packaging quantity

Packaging Type Assembled

**Weight, net** 2.05 kg | 4.52 lb

Regulatory Compliance/Certifications

Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

COMMSCOPE®

#### HTK-19-SS-2U 760072959

ROHS

Compliant





## 760092361 | MGS600-003



### GigaSPEED X10D® MGS600 Series Information Outlet, black

- Electrical performance guaranteed to meet or exceed the channel specifications to ISO/IEC 11801 Class EA and ANSI/TIA-568-C.2 Category 6A
- Patented crossing of straddling pair contacts enables efficient alien crosstalk reduction in the channel
- Snaps into standard M-series faceplates, surface-mount boxes, consolidation point boxes and modular panels
- Mountable either at 90 degrees (straight) or 45 degrees (angled) in M-series faceplate
- Universal design and label supports both T568 A & B wiring
- IDC connector terminations on rear of base allow quick and easy installation of 22 to 24 AWG cable
- Support network line speeds up to at least 10 gigabits per second
- Low-profile rear protective strain relief cap, protects against contamination and secures the connection

### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | EMEA | Latin

America | North America

**Portfolio** SYSTIMAX®

Product Type Modular jack

Product Brand GigaSPEED X10D®

General Specifications

ANSI/TIA Category 6A

Cable Type Unshielded

**Color** Black

Conductor Type Solid | Stranded

Integrated Dust Cover Type None

Mounting Note Color matches with M-series Black Faceplates and Surface

Mount Boxes

Termination Type IDC

**Wiring** T568A | T568B

Dimensions

**Height** 20.32 mm | 0.8 in

**Width** 20.38 mm | 0.802 in



## 760092361 | MGS600-003

Depth30.48 mm | 1.2 inCompatible Conductor Gauge, solid22 AWG | 24 AWGCompatible Conductor Gauge, stranded22 AWG | 24 AWG

**Electrical Specifications** 

 Contact Resistance Variation, maximum
 20 mOhm

 Contact Resistance, maximum
 100 mOhm

Current Rating at Temperature 1.5 A @ 20 °C | 1.5 A @ 68 °F

Dielectric Withstand Voltage, RMS, conductive surface1,500 Vac @ 60 HzDielectric Withstand Voltage, RMS, contact-to-contact1,000 Vac @ 60 Hz

**Insulation Resistance, minimum** 500 MOhm

Remote Powering Fully supports the safe delivery of power over LAN cabling

described by IEEE 802.3bt (Type 4) and complies with the unmating under electrical load requirements prescribed by IEC

60512-99-002

Material Specifications

Contact Plating Material Precious metals

Material Type Copper alloy | High-impact, flame retardant, thermoplastic

Termination Contact Plating Nickel

Mechanical Specifications

Plug Insertion Life, minimum 750 times

Plug Insertion Life, test plug IEC 60603-7 compliant plug

Plug Retention Force, minimum 133 N | 29.9 lbf

**Environmental Specifications** 

Operating Temperature -10 °C to +60 °C (+14 °F to +140 °F)

Storage Temperature  $-40 \,^{\circ}\text{C}$  to  $+70 \,^{\circ}\text{C}$  ( $-40 \,^{\circ}\text{F}$  to  $+158 \,^{\circ}\text{F}$ )

**Relative Humidity**Up to 95%, non-condensing

Flammability Rating UL 94 V-0
Safety Standard UL | cUL

Packaging and Weights

Packaging Material Standard



# 760092361 | MGS600-003

#### Packaging quantity

1

## Regulatory Compliance/Certifications

Agency Classification

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant



## 760152801 | HGS620



GigaSPEED X10D® HGS620 Shielded High Density Information Outlet

### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | EMEA | Latin

America | North America

Portfolio SYSTIMAX®

**Product Type** Modular jack

**Product Brand** GigaSPEED X10D®

General Specifications

ANSI/TIA Category 6A

**Application** Adapts to M Series and Keystone

Cable TypeShieldedColorSilver

Conductor Type Solid | Stranded

Integrated Dust Cover Type None

Outlet Type High density

Termination Type IDC

Transmission Standards ANSI/TIA-568-D.2 | ISO/IEC 11801 Class EA

**Wiring** T568A | T568B

**Dimensions** 

 Height
 19.56 mm | 0.77 in

 Width
 17.02 mm | 0.67 in

 Depth
 33.53 mm | 1.32 in

 Compatible Conductor Gauge, solid
 22 AWG | 24 AWG

 Compatible Conductor Gauge, stranded
 22 AWG | 24 AWG

**Electrical Specifications** 

**COMMSCOPE®** 

## 760152801 | HGS620

**Contact Resistance Variation, maximum** 20 mOhm

Contact Resistance, maximum 100 m0hm

Current Rating at Temperature 1.5 A @ 20 °C | 1.5 A @ 68 °F

**Dielectric Withstand Voltage, RMS, conductive surface** 1,500 Vac @ 60 Hz

Dielectric Withstand Voltage, RMS, contact-to-contact 1,000 Vac @ 60 Hz

Insulation Resistance, minimum 500 MOhm

**Remote Powering** Fully supports the safe delivery of power over LAN cabling

described by IEEE 802.3bt (Type 4) and complies with the unmating under electrical load requirements prescribed by IEC

60512-99-002

Material Specifications

Contact Plating Material Precious metals

Material Type Copper alloy | High-impact, flame retardant,

thermoplastic | Tin | Zinc

Termination Contact Plating Nickel

Mechanical Specifications

Plug Insertion Life, minimum 750 times

Plug Insertion Life, test plug IEC 60603-7 compliant plug

Plug Retention Force, minimum 133 N | 29.9 lbf

**Environmental Specifications** 

**Operating Temperature**  $-10 \,^{\circ}\text{C}$  to  $+60 \,^{\circ}\text{C}$  (+14  $^{\circ}\text{F}$  to +140  $^{\circ}\text{F}$ )

**Storage Temperature**  $-40 \,^{\circ}\text{C}$  to  $+70 \,^{\circ}\text{C}$  ( $-40 \,^{\circ}\text{F}$  to  $+158 \,^{\circ}\text{F}$ )

**Relative Humidity** Up to 95%, non-condensing

Flammability Rating UL 94 V-0

Safety Standard UL | cUL

Packaging and Weights

Packaging quantity 25

Regulatory Compliance/Certifications

Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

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# 760152801 | HGS620

REACH-SVHC

Compliant as per SVHC revision on www.commscope.com/ProductCompliance

**ROHS** 

Compliant





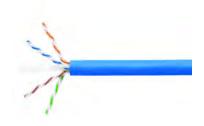
### Included Products

760154187 HGS-A-MS-WHITE

High Density M-Series Adapter, white



## 760107094 | 1091B BLU C6A 4/23 U/UTP W1000



GigaSPEED X10D® 1091B ETL Verified Category 6A U/UTP Cable, blue jacket, 4 pair count, 1000 ft (305 m) length, WE TOTE® box

#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | Latin America | North America

Portfolio SYSTIMAX®

Product Type Twisted pair cable
Product Brand GigaSPEED X10D®

General Specifications

Product Number 1091B

ANSI/TIA Category 6A

Cable Component Type Horizontal

Cable Type U/UTP (unshielded)

Conductor Type, singlesSolidConductors, quantity8Jacket ColorBluePairs, quantity4

Separator Type Isolator

**Transmission Standards** ANSI/TIA-568.2-D | ISO/IEC 11801 Class EA

Dimensions

 Cable Length
 304.8 m | 1000 ft

 Diameter Over Conductor
 0.864 mm | 0.034 in

 Diameter Over Jacket, nominal
 7.239 mm | 0.285 in

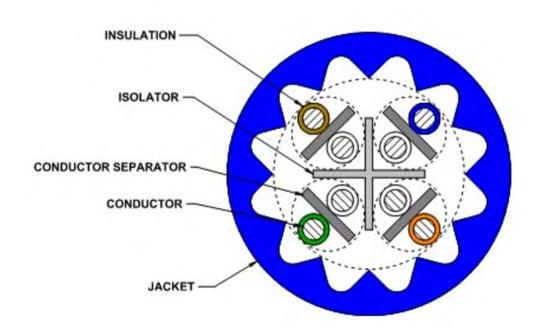
 Jacket Thickness
 1.295 mm | 0.051 in

Conductor Gauge, singles 23 AWG



## 760107094 | 1091B BLU C6A 4/23 U/UTP W1000

## Cross Section Drawing



## **Electrical Specifications**

**Characteristic Impedance** 100 ohm **Characteristic Impedance Tolerance** ±15 ohm

dc Resistance Unbalance, maximum 4 %

dc Resistance, maximum 7.61 ohms/100 m | 2.32 ohms/100 ft

**Dielectric Strength, minimum** 1500 Vac | 2500 Vdc

LP (Limited Power) Rating 0.5 A

Mutual Capacitance at Frequency 6.0 nF/100 m @ 1 kHz

Nominal Velocity of Propagation (NVP) 65 %

Operating Frequency, maximum 550 MHz
Operating Voltage, maximum 80 V

**Remote Powering** Fully complies with the recommendations set forth by IEEE 802.3bt (Type 4) for the

safe delivery of power over LAN cable when installed according to ISO/IEC 14763-2,

CENELEC EN 50174-1, CENELEC EN 50174-2 or TIA TSB-184-A

Material Specifications

Conductor MaterialBare copperInsulation MaterialPolyolefin

Page 2 of 3



## 760107094 | 1091B BLU C6A 4/23 U/UTP W1000

Jacket Material PVC

Separator MaterialPolyolefinSeparator 2 MaterialPolyolefin

Mechanical Specifications

**Pulling Tension, maximum** 11.34 kg | 25 lb

**Environmental Specifications** 

Installation temperature  $0 \,^{\circ}\text{C}$  to +60  $^{\circ}\text{C}$  (+32  $^{\circ}\text{F}$  to +140  $^{\circ}\text{F}$ )

Operating Temperature  $-20 \,^{\circ}\text{C}$  to +60  $^{\circ}\text{C}$  (-4  $^{\circ}\text{F}$  to +140  $^{\circ}\text{F}$ )

Environmental Space Non-plenum

Temperature Rating, UL 90 °C | 194 °F

Flame Test Method CMR

Packaging and Weights

**Cable weight** 55.509 kg/km | 37.3 lb/kft

Packaging Type WE TOTE® box

Regulatory Compliance/Certifications

Agency Classification

CHINA-ROHS

Below maximum concentration value

ISO 9001:2015

Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant





## 760107201 | 2091B BLU C6A 4/23 U/UTP W1000



GigaSPEED X10D® 2091B ETL Verified Category 6A U/UTP Cable, blue jacket, 4 pair count, 1000 ft (305 m) length, WE TOTE® box

#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio SYSTIMAX®

Product Type Twisted pair cable
Product Brand GigaSPEED X10D®

General Specifications

Product Number 2091B

ANSI/TIA Category 6A

Cable Component Type Horizontal

Cable Type U/UTP (unshielded)

Conductor Type, singles Solid
Conductors, quantity 8

Jacket Color Blue

**Note** Consult ANSI/TIA-568-C.2 Annex G for length de-rating guidance for cable

installation in higher temperature environments

Pairs, quantity 4

Separator Type Isolator

**Transmission Standards** ANSI/TIA-568.2-D | ISO/IEC 11801 Class EA

Dimensions

 Cable Length
 304.8 m | 1000 ft

 Diameter Over Conductor
 0.889 mm | 0.035 in

 Diameter Over Jacket, nominal
 7.239 mm | 0.285 in

 Jacket Thickness
 1.295 mm | 0.051 in

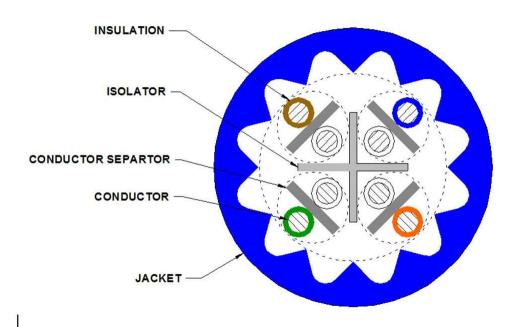


## 760107201 | 2091B BLU C6A 4/23 U/UTP W1000

**Conductor Gauge, singles** 

23 AWG

## Cross Section Drawing



## **Electrical Specifications**

dc Resistance Unbalance, maximum 4 %

dc Resistance, maximum 7.61 ohms/100 m | 2.32 ohms/100 ft

**Dielectric Strength, minimum** 1500 Vac | 2500 Vdc

LP (Limited Power) Rating 0.6 A

Mutual Capacitance at Frequency 6.0 nF/100 m @ 1 kHz

Nominal Velocity of Propagation (NVP)  $$66\,\%$$  Operating Frequency, maximum  $$550\,\mathrm{MHz}$$ 

Operating Voltage, maximum 80 V

**Remote Powering** Fully complies with the recommendations set forth by IEEE 802.3bt (Type 4) for the

safe delivery of power over LAN cable when installed according to ISO/IEC 14763-2,

CENELEC EN 50174-1, CENELEC EN 50174-2 or TIA TSB-184-A

## Material Specifications

**Conductor Material** Bare copper

Insulation Material FEP

Jacket Material PVC

Page 2 of 3



## 760107201 | 2091B BLU C6A 4/23 U/UTP W1000

Separator Material FEP

Separator 2 Material Polyolefin

Mechanical Specifications

**Pulling Tension, maximum** 11.34 kg | 25 lb

**Environmental Specifications** 

Installation temperature  $0 \,^{\circ}\text{C}$  to +60  $^{\circ}\text{C}$  (+32  $^{\circ}\text{F}$  to +140  $^{\circ}\text{F}$ )

**Operating Temperature**  $-20 \,^{\circ}\text{C to} + 75 \,^{\circ}\text{C} \left(-4 \,^{\circ}\text{F to} + 167 \,^{\circ}\text{F}\right)$ 

Environmental Space Plenum

Temperature Rating, ETL  $105 \,^{\circ}\text{C} \mid 221 \,^{\circ}\text{F}$  Temperature Rating, UL  $105 \,^{\circ}\text{C} \mid 221 \,^{\circ}\text{F}$ 

Flame Test Method CMP/FT6

Smoke Test Method CMP/FT6

Packaging and Weights

**Cable weight** 60.568 kg/km | 40.7 lb/kft

Packaging Type WE TOTE® box

Regulatory Compliance/Certifications

Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant





# 760150144 | 360-IPR-MFTP-E-HD6B-1U-24



SYSTIMAX 360™ GigaSPEED X10D® Evolve High Density Shielded Modular Panel, 24 port

#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | EMEA | Latin

America | North America

Portfolio SYSTIMAX®

**Product Type** RJ45 patch panel

Product Brand GigaSPEED X10D® | SYSTIMAX 360™

General Specifications

ANSI/TIA Category 6A

Cable Type Shielded

Color Cool gray | Satin chrome

Conductor Type Solid | Stranded

Intelligence Type iPatch® ready

Panel StyleStraightRack TypeEIA 19 in

Rack Units 1

Termination Type IDC

Total Ports, quantity 24

Transmission Standards ANSI/TIA-568.2-D | ISO/IEC 11801 Class EA

**Wiring** T568A | T568B

Dimensions

 Height
 43.69 mm | 1.72 in

 Width
 482.6 mm | 19 in

 Depth, with cable management
 165.1 mm | 6.5 in

Page 1 of 3



## 760150144 | 360-IPR-MFTP-E-HD6B-1U-24

Compatible Conductor Gauge, solid22 AWG24 AWGCompatible Conductor Gauge, stranded22 AWG24 AWG

**Electrical Specifications** 

**Dielectric Withstand Voltage, RMS, contact-to-contact** 1,000 Vac @ 60 Hz

**Insulation Resistance, minimum** 500 MOhm

Material Specifications

Contact Plating Material Precious metals

Material Type High-impact, flame retardant, thermoplastic | Powder-

coated steel

Termination Contact Plating Nickel

Mechanical Specifications

**Plug Insertion Life, minimum** 750 times

Plug Insertion Life, test plug IEC 60603-7 compliant plug

Plug Retention Force, minimum 133 N | 29.9 lbf

**Environmental Specifications** 

**Operating Temperature**  $-10 \,^{\circ}\text{C}$  to  $+60 \,^{\circ}\text{C}$  (+14  $^{\circ}\text{F}$  to +140  $^{\circ}\text{F}$ )

Storage Temperature  $-40 \,^{\circ}\text{C}$  to  $+70 \,^{\circ}\text{C}$  ( $-40 \,^{\circ}\text{F}$  to  $+158 \,^{\circ}\text{F}$ )

**Relative Humidity** Up to 95%, non-condensing

Flammability Rating UL 94 V-0
Safety Standard UL | cUL

Packaging and Weights

Packaging quantity 1

**Weight, net** 0.816 kg | 1.8 lb

### Regulatory Compliance/Certifications

Agency Classification

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant



## 760150144 | 360-IPR-MFTP-E-HD6B-1U-24



Page 3 of 3

## 760151498 | 360-IPR-MFTP-E-HD6B-2U-48



# SYSTIMAX 360™ GigaSPEED X10D® Evolve High Density Shielded Modular Panel, 48 port

#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | EMEA | Latin

America | North America

22 AWG | 24 AWG

**Portfolio** SYSTIMAX®

**Product Type** RJ45 patch panel

Product Brand GigaSPEED X10D® | SYSTIMAX 360™

General Specifications

ANSI/TIA Category 6A

Cable Type Shielded

Color Cool gray | Satin chrome

Conductor Type Solid | Stranded

Intelligence Type iPatch® ready

Panel StyleStraightRack TypeEIA 19 in

Rack Units 2

Termination Type IDC

Total Ports, quantity 48

**Transmission Standards**ANSI/TIA-568-D.2 | ISO/IEC 11801 Class E

**Wiring** T568A | T568B

**Dimensions** 

Compatible Conductor Gauge, stranded

Height44.45 mm| 1.75 inWidth482.6 mm| 19 inDepth, with cable management165.1 mm| 6.5 inCompatible Diameter Over Dielectric, minimum0.762 mm| 0.03 inCompatible Conductor Gauge, solid22 AWG| 24 AWG

Page 1 of 2



## 760151498 | 360-IPR-MFTP-E-HD6B-2U-48

### **Electrical Specifications**

**Dielectric Withstand Voltage, RMS, contact-to-contact** 1,000 Vac @ 60 Hz

**Insulation Resistance, minimum** 500 MOhm

Material Specifications

Contact Plating Material Precious metals

Material Type High-impact, flame retardant, thermoplastic | Powder-

coated steel

Termination Contact Plating Nickel

Mechanical Specifications

Plug Insertion Life, minimum 750 times

Plug Insertion Life, test plug IEC 60603-7 compliant plug

Plug Retention Force, minimum 133 N | 29.9 lbf

**Environmental Specifications** 

**Operating Temperature**  $-10 \,^{\circ}\text{C} \text{ to } +60 \,^{\circ}\text{C} \text{ (+14 }^{\circ}\text{F to } +140 \,^{\circ}\text{F)}$ 

Storage Temperature  $-40 \,^{\circ}\text{C}$  to  $+70 \,^{\circ}\text{C}$  ( $-40 \,^{\circ}\text{F}$  to  $+158 \,^{\circ}\text{F}$ )

**Relative Humidity** Up to 95%, non-condensing

Flammability Rating UL 94 V-0
Safety Standard UL | cUL

Packaging and Weights

Packaging quantity

**Weight, net** 1.361 kg | 3 lb

### Regulatory Compliance/Certifications

#### Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant





## 760237066 | CPP-6A-SDDM-SL-1U-48

### Discrete Distribution Module Panel, Cat 6A, SL, STP, 1U, 48 port



#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | EMEA | Latin

America | North America

Portfolio CommScope®

**Product Type** RJ45 patch panel

Product Series SL Series

General Specifications

ANSI/TIA Category 6A

Cable TypeShieldedColorBlack

**Growth Configuration** Fully loaded

Modules, quantity 4

Panel StyleStraightRack TypeEIA 19 in

Rack Units 1

Total Ports, quantity 48

**Transmission Standards**ANSI/TIA-568-D.2 | ISO/IEC 11801 Class EA

**Wiring** T568A | T568B

**Dimensions** 

Height44.45 mm | 1.75 inWidth482.6 mm | 19 inDepth, with cable management119.38 mm | 4.7 inCompatible Diameter Over Dielectric, maximum1.168 mm | 0.046 in

Page 1 of 2



## 760237066 | CPP-6A-SDDM-SL-1U-48

Compatible Diameter Over Dielectric, minimum 0.762 mm | 0.03 in

**Electrical Specifications** 

Current Rating at Temperature 1.5 A @ 20 °C | 1.5 A @ 68 °F

Dielectric Withstand Voltage, RMS, conductive surface1,500 Vac @ 60 HzDielectric Withstand Voltage, RMS, contact-to-contact1,000 Vac @ 60 Hz

**Insulation Resistance, minimum** 500 MOhm

Material Specifications

Material Type High-impact, flame retardant, thermoplastic | Powder-

coated steel

**Environmental Specifications** 

**Operating Temperature**  $-10 \,^{\circ}\text{C} \text{ to } +60 \,^{\circ}\text{C} \text{ (+14 }^{\circ}\text{F to } +140 \,^{\circ}\text{F)}$ 

Storage Temperature  $-40 \,^{\circ}\text{C}$  to  $+70 \,^{\circ}\text{C}$  ( $-40 \,^{\circ}\text{F}$  to  $+158 \,^{\circ}\text{F}$ )

**Relative Humidity**Up to 95%, non-condensing

Flammability Rating UL 94 V-0

Safety Standard RCM | UL | cUL

Packaging and Weights

Included Modular jacks (48)

Packaging quantity 1

Regulatory Compliance/Certifications

Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

RCM Compliant to electrical safety & telecommunications requirements

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant









## CO199K2



# MiNo6A Series Category 6A U/UTP Reduced Diameter LS-CM Dual Rated Cord

- Perfect for cross connects, workstations or racks with higher-density and/or limited space
- Small diameter unshielded twisted pair patch cords (0.195 inch/4.95 mm) that offers flexibility, durability and reliability
- Unique laminate barrier wrap provides excellent alien cross-talk performance

#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio CommScope®

**Product Type**Twisted pair patch cord

Product Series CC

Ordering Note Cords < 1 m are valid elements for use in a channel or as an equipment interconnect but

due to their limited length are not guaranteed to meet component compliance

requirements that were developed to assess the quality of longer cords | Cords > 1 m are authorized for use in channels and are an effective standalone method used to

connect active devices

### General Specifications

**ANSI/TIA Category** 6A (except wire gauge)

**Cable Type** U/UTP (unshielded)

Conductor Type Solid

Interface, Connector ARJ45 plugInterface Feature, connector AStandardInterface, Connector BRJ45 plugInterface Feature, connector BStandard

Jacket Color Black | Blue | Dark gray | Light

blue | Orange | Pink | Purple | Red | Spring

green | Violet | White | Yellow

Pairs, quantity

Transmission Standards IEEE 802.3bt Type 4 | ISO/IEC 11801 Class EA | TIA/EIA-568 Cat 6A

Wiring T568B

Dimensions

Cable Assembly Length Range (m) 1-30

**COMMSCOPE®** 

## CO199K2

Cable Assembly Length Range (ft)1-100Cable Assembly Length Range (cm)15-999Cable Assembly Length Range (in)6-999

**Diameter Over Jacket** 4.95 mm | 0.195 in

Compatible Conductor Gauge, solid 28 AWG

## Wiring Diagram

	Connector A	Connector B
Position 1	White/Orange	White/Orange
Position 2	Orange	Orange
Position 3	Lt. Green	Lt. Green
Position 4	Blue	Blue
Position 5	Lt. Blue	Lt. Blue
Position 6	Green	Green
Position 7	Lt. Brown	Lt. Brown
Position 8	Brown	Brown

## **Electrical Specifications**

Material Specifications

**Conductor Material** Copper Alloy, Polycarbonate

Contact Plating MaterialGold over nickelMaterial TypePhosphor Bronze

Mechanical Specifications

Plug Insertion Life, minimum 750 times

Plug Retention Force, minimum 90 N | 20.233 lbf

Environmental Specifications

**Operating Temperature**  $-10 \,^{\circ}\text{C}$  to  $+60 \,^{\circ}\text{C}$  (+14  $^{\circ}\text{F}$  to +140  $^{\circ}\text{F}$ )

Page 2 of 3



## CO199K2

**Environmental Space** Low Smoke Zero Halogen (LSZH) | Non-plenum

Flammability Rating CM-LS
Safety Standard UL 1863

Packaging and Weights

Packaging quantity

Regulatory Compliance/Certifications

Agency Classification

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system



## CPCSSX2



## GigaSPEED X10D® 360GS10E Solid Cordage Modular Patch Cord

### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio SYSTIMAX®

Product Type Twisted pair patch cord

Product Brand GigaSPEED X10D®

Product Series CPC

Ordering Note Cords < 1 m are valid elements for use in a channel or as an equipment interconnect but

due to their limited length are not guaranteed to meet component compliance requirements that were developed to assess the quality of longer cords | Cords > 1 m are authorized for use in channels and are an effective standalone method used to connect active devices

### General Specifications

ANSI/TIA Category 6A

Cable Type U/UTP (unshielded)

Conductor Type Solid

Interface, Connector ARJ45 plugInterface Feature, connector AStandardInterface, Connector BRJ45 plugInterface Feature, connector BStandard

Jacket Color Black | Blue | Dark gray | Light

blue | Lilac | Orange | Pink | Purple | Red | Slate | Spring

green | Violet | White | Yellow

Pairs, quantity

**Transmission Standards** IEEE 802.3bt Type 4

Wiring T568B

**Dimensions** 

Cable Assembly Length Range (m) 1-30

**COMMSCOPE®** 

## CPCSSX2

Cable Assembly Length Range (ft)1-100Cable Assembly Length Range (cm)15-999Cable Assembly Length Range (in)6-999

**Diameter Over Jacket** 7.24 mm | 0.285 in

## Wiring Diagram

	Connector A	Connector B
Position 1	White/Orange	White/Orange
Position 2	Orange	Orange
Position 3	Lt. Green	Lt. Green
Position 4	Blue	Blue
Position 5	Lt. Blue	Lt. Blue
Position 6	Green	Green
Position 7	Lt. Brown	Lt. Brown
Position 8	Brown	Brown

### **Electrical Specifications**

dc Resistance, maximum0.3 ohmSafety Voltage Rating300 V

Material Specifications

Contact Plating Material Precious metals

Material Type Copper alloy | Polycarbonate

Mechanical Specifications

Plug Insertion Life, minimum 750 times

Plug Retention Force, minimum 133 N | 29.9 lbf

**Environmental Specifications** 

**Operating Temperature**  $-10 \,^{\circ}\text{C} \text{ to } +60 \,^{\circ}\text{C} \text{ (+14 }^{\circ}\text{F to } +140 \,^{\circ}\text{F)}$ 

Environmental Space Non-plenum
Flammability Rating UL 94 V-0

COMMSCOPE®

## CPCSSX2

Safety Standard ETL | cETL

Packaging and Weights

Packaging quantity

Regulatory Compliance/Certifications

Agency Classification

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system







# APPENDIX E.4: COMMSCOPE FIBER STRUCTURED CABLING SYSTEM PART NUMBERS

ACUTE SITE NEW CONSTRUCTION PROJECT AND RENOVATION PROJECT WITH NEW MER/TR; AND COMMUNITY SITE NEW CONSTRUCTION AND RENOVATION PROJECTS

Version 01

January 2022

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11	Commercing Product Data Shoots

### 1. Purpose

The purpose of this list of CommScope parts is to ensure all PHSA pre-approved Div.27 contractors provide the same products for healthcare facilities in BC when installing CommScope structured cabling system solution and following the requirements of the latest PHSA Communications Infrastructure Standards & Specifications. If you are unable to provide the listed parts for your specific project, you must defer to PHSA for guidance.

#### 2. Fiber Patch Panels

- 2.1. EHD Patch Panel 1U... EHD-1U
  SYSTIMAX EHD 1U sliding tray fber panel, accepts (6) EHD ULL modules, splice cassettes, providing up to 72 duplex LC ports
- 2.2. EHD Patch Panel 2U... EHD-2U
  SYSTIMAX EHD 2U sliding tray fber panel, accepts (12) EHD ULL modules, splice cassettes, providing up to 144 duplex LC ports
- 2.3. EHD Patch Panel 4U... EHD-4U
  SYSTIMAX EHD 4U sliding tray fber panel, accepts (24) EHD ULL modules, splice cassettes, providing up to 288 duplex LC ports

### 3. Fiber Splicing Cassette

- 3.1. EHD ULL 24f LC empty splice cassette OM5...760248038 (EHD-FT-00-LC-WB-00-00)
- 3.2. EHD ULL 24f LC empty splice cassette SM... 760248037 (EHD-FT-00-LC-SM-00-00)

## 4. Fiber Frame and Fiber Management

- 4.1. Cables with higher fiber count TBD several options
- 4.2. Fiber Management Spool TBD several options

### 5. Armoured Fiber Cables (PART #'s below are INDOOR ONLY)

- 5.1. OS2
  - 5.1.1. 24 strands OS2 Fiber Distribution Plenum Indoor... 760127886 P-024-DZ-8W-FSUYL
  - 5.1.2. 12 strands OS2 Fiber Distribution Plenum Indoor... 760127803 P-012-DZ-8W-FSUYL
- 5.2. OM5
  - 5.2.1. 24 strands OM5 Fiber Distribution Plenum Indoor... 760229534 P-024-DZ-5G-FSULM
  - 5.2.2. 12 strands OM5 Fiber Distribution Plenum Indoor... 760229518 P-012-DZ-5G-FSULM

### 6. Armoured Fiber Cables (PART #'s below are INDOOR/OUTDOOR)

- 6.1. OS2
  - 6.1.1. 24 strands TeraSPEED® Fiber Dist. Plenum... 760134932 P-024-OZ-8W-FSUBK
  - 6.1.2. 12 strands TeraSPEED® Fiber Dist. Plenum... 760134924 P-012-OZ-8W-FSUBK
- 6.2. OM5
  - 6.2.1. 24 strands LazrSPEED® Fiber Dist. Plenum... 760250013 P-024-OZ-5G-FSUBK
  - 6.2.2. 12 strands LazrSPEED® Fiber Dist. Plenum... 760238363 P-012-LZ-5G-F12BK/25D

### 7. Fiber patch cord OM5, LC/LC Duplex:

- 7.1. 1m (3')... UFVLCLC42-NXF003
- 7.2. 1.5m (5')... UFVLCLC42-NXF005
- 7.3. 2.1 m (7'), mostly... UFVLCLC42-NXF007
- 7.4. 3m (10'), mostly... UFVLCLC42-NXF010
- 7.5. 4.6m (15')... UFVLCLC42-NXF015
- 7.6. 6.1m (20')... UFVLCLC42-NXF020

## 8. Fiber patch cord OS2, LC/LC Duplex:

- 8.1. 1.5m (5')... UFGLCLC42-JXF005
- 8.2. 2.1 m (7'), mostly... UFGLCLC42-JXF007
- 8.3. 3m (10'), mostly... UFGLCLC42-JXF010
- 8.4. 4.6m (15')... UFGLCLC42-JXF015
- 8.5. 6.1m (20')... UFGLCLC42-JXF020

## 9. Fusion Splice On Connectors

- 9.1. LC, Singlemode, OS2 QWIK Fuse Splice on Connector (12 pack)... 760243372
- 9.2. LC, Multimode OM3\4\5 QWIK FUSE Splice on Connector (12 pack)... 760243371
- 9.3. SC, Singlemode, OS2 QWIK Fuse Splice on Connector (12 pack)... 760243394
- 9.4. SC, Multimode OM3\4\5 QWIK FUSE Splice on Connector (12 pack)... 760243391

### 10. MPO Cassette

- 10.1. MPO low loss OS2 Cassette, LC/LC Duplex...760237992
- 10.2. MPO low loss OM5 Cassette, LC/LC Duplex... 760238000

#### 11. Pre-terminated Fiber Trunk Cable

- 11.1. Pre-terminated OM5 Trunk Cable... UJV2X2XBF
- 11.2. Pre-terminated OS2 Trunk Cable... AJGMXMXAF

## 12. Pre-terminated UTP Trunk Cable (CONTACT COMMSCOPE)

- 12.1. CAT6A Pre-terminated Cable Assembly... InstaPATCH C-Series 6A
- 12.2. CAT6 Pre-terminated Cable Assembly... InstaPATCH C-Series 6

### 13. Pre-terminated UTP Patch Panel (CONTACT COMMSCOPE)

13.1. KeyConnect Patch Panel, 48-port, 1U, with CAT6+ RJ45 Coupler, Black... TBD

## 14. CommScope Product Data Sheets

SUBMITTED BY: CommScope DATE: 01/10/2022

ATTN: Kevin Wallingford **E-mail:** Kevin.Wallingford@commscope.com

#### Fiber Cassettes

Part Number   Name	Description	Comment	Quantity
760248037   EHD-FT-00-LC-SM- 00-00	EHD Singlemode, 24 port LC field term splice cassette		1
760248038   EHD-FT-00-LC-WB- 00-00	EHD Multimode OM5, 24 port LC field term splice cassette		1

#### Fiber Connectors

	Part Number   Name	Description	Comment	Quantity
The second second	760243371   MFC-LCF-20-5Y-12- PACK	Qwik-Fuse Connector, LC, OM3/OM4/OM5, Aqua, for 1.6/2.0 mm, 12 per pack		1
	760243372   SFC-LCF-09-8Y-12- PACK	Qwik-Fuse Connector, LC, SM-UPC, Blue, for 250μm/900μm, 12 per pack		1
	760243391   MFC-SCF-09-5Y-12- PACK	Qwik-Fuse Connector, SC, OM3/OM4/OM5 , Aqua, for 250μm/900μm, 12 per pack		1
	760243394   SFC-SCF-09-8Y-12- PACK	Qwik-Fuse Connector, SC, SM-UPC, Blue, for 250μm/900μm, 12 per pack		1

#### Fiber Indoor & Outdoor Cables

	Part Number   Name	Description	Comment	Quantity
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	Part Number   Name	Description	Comment	Quantity
	760134924   P-012-0Z-8W-FSUBK	TeraSPEED® Indoor/Outdoor Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 12 fiber single-unit		1
	760134932   P-024-OZ-8W-FSUBK	TeraSPEED® Indoor/Outdoor Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit		1
S DIM	760238363   P-012-LZ-5G- F12BK/25D	LazrSPEED® Indoor/Outdoor, Plenum Rated, Gel-Free, Stranded Loose Tube Cable with Aluminum Interlocking Armor containing a Plenum Rated Outer Jacket		1
	760250013   P-024-0Z-5G-FSUBK	LazrSPEED® Indoor/Outdoor Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit		1

#### Fiber Indoor Cables

	Part Number   Name	Description	Comment	Quantity
	760127803   P-012-DZ-8W-FSUYL	TeraSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 12 fiber single-unit		1
	760127886   P-024-DZ-8W-FSUYL	TeraSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit		1
- FEIL	760229518   P-012-DZ-5G-FSULM	LazrSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 12 fiber single-unit		1
-	760229534   P-024-DZ-5G-FSULM	LazrSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit		1

#### Fiber Modules

Part Number   Name	Description	Comment	Quantity
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Part Number   Name	Description	Comment	Quantity
760237992   EHD12-DM-24LC- SM-B-ULL	EHD ULL Singlemode MPO-12 distribution module, 24LC to 2x12f MPOs unpinned, dust plugs		1
760238000   EHD24-DM-24LC- WB-B-ULL	EHD ULL Multimode OM5 Wideband MPO-24 distribution module, 24LC to 1x24f MPOs unpinned, dust plugs		1

#### Fiber Panels

	Part Number   Name	Description	Comment	Quantity
	EHD-1U	SYSTIMAX® EHD 1U sliding tray fiber panel, accepts (6) EHD ULL modules, splice cassettes or MPO panels, providing up to 72 duplex LC ports or up to 72 MPO ports, High Speed Migration		1
1-	EHD-2U	SYSTIMAX® EHD 2U sliding tray fiber panel, accepts (12) EHD ULL modules, splice cassettes or MPO panels, providing up to 144 duplex LC ports or up to 144 MPO ports, High Speed Migration		1
	EHD-4U	SYSTIMAX® EHD 4U sliding tray fiber panel, accepts (24) EHD ULL modules, splice cassettes or MPO panels, providing up to 288 duplex LC ports or up to 288 MPO ports, High Speed Migration		1

#### Fiber Patch Cords

	Part Number   Name	Description	Comment	Quantity
		Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, J - Yellow, X - No breakouts, 3, ft		1

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Part Number   Name	Description	Comment	Quantity
UDGLCLC42-JXF005	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, J - Yellow, X - No breakouts, 5, ft		1
UDGLCLC42-JXF007	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, J - Yellow, X - No breakouts, 7, ft		1
UDGLCLC42-JXF010	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, J - Yellow, X - No breakouts, 10, ft		1
UDGLCLC42-JXF015	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, J - Yellow, X - No breakouts, 15, ft		1
UDGLCLC42-JXF020	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, J - Yellow, X - No breakouts, 20, ft		1
UDVLCLC42-NXF003	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, N - Lime Green, X - No breakouts, 3, ft		1
UDVLCLC42-NXF005	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, N - Lime Green, X - No breakouts, 5, ft		1

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	Part Number   Name	Description	Comment	Quantity
	UDVLCLC42-NXF007	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, N - Lime Green, X - No breakouts, 7, ft		1
THE RESERVENCE	UDVLCLC42-NXF010	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, N - Lime Green, X - No breakouts, 10, ft		1
	UDVLCLC42-NXF015	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, N - Lime Green, X - No breakouts, 15, ft		1
The state of the s	UDVLCLC42-NXF020	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Plenum, N - Lime Green, X - No breakouts, 20, ft		1
	UFGLCLC42-JXF003	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, J - Yellow, X - No breakouts, 3, ft		1
	UFGLCLC42-JXF005	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, J - Yellow, X - No breakouts, 5, ft		1
	UFGLCLC42-JXF007	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, J - Yellow, X - No breakouts, 7, ft		1
	UFGLCLC42-JXF010	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, J - Yellow, X - No breakouts, 10, ft		1

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	Part Number   Name	Description	Comment	Quantity
	UFGLCLC42-JXF015	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, J - Yellow, X - No breakouts, 15, ft		1
	UFGLCLC42-JXF020	Ultra Low Loss Singlemode, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, J - Yellow, X - No breakouts, 20, ft		1
	UFVLCLC42-NXF003	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, N - Lime Green, X - No breakouts, 3, ft		1
C. A. A.	UFVLCLC42-NXF005	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, N - Lime Green, X - No breakouts, 5, ft		1
	UFVLCLC42-NXF007	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, N - Lime Green, X - No breakouts, 7, ft		1
THE PERSON NAMED IN COLUMN TO PERSON NAMED I	UFVLCLC42-NXF010	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, N - Lime Green, X - No breakouts, 10, ft		1
	UFVLCLC42-NXF015	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, N - Lime Green, X - No breakouts, 15, ft		1

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Part Number   Name	Description	Comment	Quantity
UFVLCLC42-NXF020	Ultra Low Loss OM5, LC to LC, Fiber Patch Cord, 1.6 mm Duplex, Low Smoke Zero Halogen, N - Lime Green, X - No breakouts, 20, ft		1

#### MPO Cable Assemblies

	Part Number   Name	Description	Comment	Quantity
2	AJGMXMXAF-JAM100	Singlemode MPO12 (Pinned) to MPO12 (Pinned), Fiber Trunk Cable Assembly, 24-Fiber, Method A, Low Smoke Zero Halogen, 100, m, J-Yellow, A - 33 inch breakout (end A/end B), no gland, no pulling grip [standard option]		1
9	UJV2X2XBF-NAM100	Ultra Low Loss (ULL) OM5 MPO24 (Pinned) to MPO24 (Pinned), Fiber Trunk Cable Assembly, 24-Fiber, Low Smoke Zero Halogen (LSZH), 100, m, N - Lime Green, A - 33 inch breakout (end A/end B), no gland, no pulling grip [standard option]		1

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## 760127803 | P-012-DZ-8W-FSUYL

TeraSPEED® with plenum ja

TeraSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 12 fiber single-unit

### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | Latin America | Middle East/Africa | North

America

Portfolio CommScope®

**Product Type** Fiber indoor cable

General Specifications

Armor Type Interlocking aluminum

Cable TypeDistribution

Construction Type Armored

Fiber Type, quantity 12

Jacket Color Yellow

**Subunit Type** Gel-free

**Total Fiber Count** 12

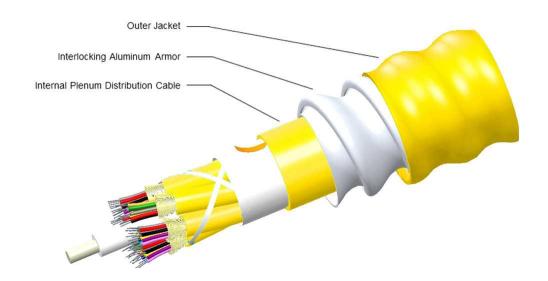
Dimensions

Diameter Over Armor10.8 mm | 0.425 inDiameter Over Jacket12.8 mm | 0.504 in

Representative Image



## 760127803 | P-012-DZ-8W-FSUYL



## Mechanical Specifications

Minimum Bend Radius, loaded192 mm7.559 inMinimum Bend Radius, unloaded128 mm5.039 inTensile Load, long term, maximum200 N | 44.962 lbfTensile Load, short term, maximum667 N | 149.948 lbf

 Compression
 85 N/mm | 485.363 lb/in

 Compression Test Method
 FOTP-41 | IEC 60794-1 E3

Flex 25 cycles

Flex Test Method FOTP-104 | IEC 60794-1 E6

**Impact** 35 N-m | 309.776 in lb

Impact Test Method FOTP-25 | IEC 60794-1 E4

**Strain** See long and short term tensile loads

Strain Test Method FOTP-33 | IEC 60794-1 E1

Twist 10 cycles

Twist Test Method FOTP-85 | IEC 60794-1 E7

**Vertical Rise, maximum** 136 m | 446.194 ft

Optical Specifications

Fiber Type G.652.D and G.657.A1, TeraSPEED® | G.652.D and G.657.A1, TeraSPEED®

## **Environmental Specifications**



## 760127803 | P-012-DZ-8W-FSUYL

Installation temperature  $0 \, ^{\circ}\text{C to} + 70 \, ^{\circ}\text{C} \ (+32 \, ^{\circ}\text{F to} + 158 \, ^{\circ}\text{F})$ Operating Temperature  $-20 \, ^{\circ}\text{C to} + 70 \, ^{\circ}\text{C} \ (-4 \, ^{\circ}\text{F to} + 158 \, ^{\circ}\text{F})$ 

**Storage Temperature**  $-40 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

Cable Qualification Standards ANSI/ICEA S-83-596 | Telcordia GR-409

Environmental Space Plenum

Flame Test Listing

NEC OFCP (ETL) and c(ETL)

Flame Test Method

NFPA 130 | NFPA 262

## **Environmental Test Specifications**

**Heat Age** -20 °C to +85 °C (-4 °F to +185 °F)

**Heat Age Test Method** IEC 60794-1 F9

**Low High Bend**  $-20 \,^{\circ}\text{C to } +70 \,^{\circ}\text{C } (-4 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

**Low High Bend Test Method** FOTP-37 | IEC 60794-1 E11

**Temperature Cycle**  $-20 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-4 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

**Temperature Cycle Test Method** FOTP-3 | IEC 60794-1 F1

Packaging and Weights

**Cable weight** 151 kg/km | 101.467 lb/kft

### Regulatory Compliance/Certifications

#### Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system
REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant



#### Included Products

CS-8W-TB - TeraSPEED® Singlemode Fiber

### \* Footnotes

**Operating Temperature** Specification applicable to non-terminated bulk fiber cable



## 760127886 | P-024-DZ-8W-FSUYL

TeraSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit

### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | Latin America | Middle East/Africa | North

America

Portfolio CommScope®

**Product Type** Fiber indoor cable

General Specifications

Armor Type Interlocking aluminum

 Cable Type
 Distribution

Construction Type Armored

Fiber Type, quantity 24

Jacket Color Yellow
Subunit Type Gel-free

Total Fiber Count 24

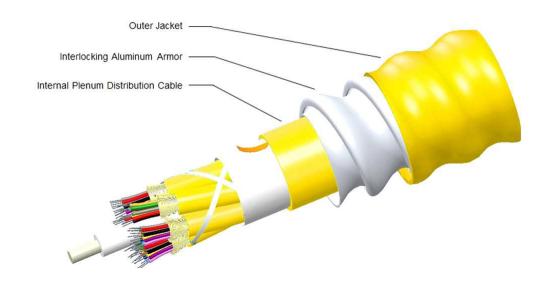
**Dimensions** 

Diameter Over Armor13.34 mm | 0.525 inDiameter Over Jacket17.4 mm | 0.685 in

Representative Image



## 760127886 | P-024-DZ-8W-FSUYL



## Mechanical Specifications

Minimum Bend Radius, loaded261 mm | 10.276 inMinimum Bend Radius, unloaded174 mm | 6.85 inTensile Load, long term, maximum400 N | 89.924 lbfTensile Load, short term, maximum1335 N | 300.12 lbf

 Compression
 85 N/mm | 485.363 lb/in

 Compression Test Method
 FOTP-41 | IEC 60794-1 E3

Flex 25 cycles

Flex Test Method FOTP-104 | IEC 60794-1 E6

**Impact** 35 N-m | 309.776 in lb

Impact Test Method FOTP-25 | IEC 60794-1 E4

**Strain** See long and short term tensile loads

Strain Test Method FOTP-33 | IEC 60794-1 E1

Twist 10 cycles

Twist Test Method FOTP-85 | IEC 60794-1 E7

**Vertical Rise, maximum** 133 m | 436.352 ft

Optical Specifications

Fiber Type G.652.D and G.657.A1, TeraSPEED® | G.652.D and G.657.A1, TeraSPEED®

## **Environmental Specifications**



## 760127886 | P-024-DZ-8W-FSUYL

Installation temperature 0 °C to +70 °C (+32 °F to +158 °F)

**Operating Temperature**  $-20 \, ^{\circ}\text{C} \text{ to } +70 \, ^{\circ}\text{C} \, (-4 \, ^{\circ}\text{F to } +158 \, ^{\circ}\text{F})$ 

**Storage Temperature**  $-40~^{\circ}\text{C}$  to  $+70~^{\circ}\text{C}$  (-40  $^{\circ}\text{F}$  to  $+158~^{\circ}\text{F}$ )

Cable Qualification Standards ANSI/ICEA S-83-596 | Telcordia GR-409

Environmental Space Plenum

Flame Test Listing NEC OFCP (ETL) and c(ETL)

Flame Test Method NFPA 130 | NFPA 262

## **Environmental Test Specifications**

**Heat Age** -20 °C to +85 °C (-4 °F to +185 °F)

**Heat Age Test Method** IEC 60794-1 F9

**Low High Bend** -20 °C to +70 °C (-4 °F to +158 °F)

**Low High Bend Test Method** FOTP-37 | IEC 60794-1 E11

**Temperature Cycle**  $-20 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-4 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

**Temperature Cycle Test Method** FOTP-3 | IEC 60794-1 F1

Packaging and Weights

**Cable weight** 307 kg/km | 206.294 lb/kft

### Regulatory Compliance/Certifications

#### Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant



#### Included Products

CS-8W-TB - TeraSPEED® Singlemode Fiber

### \* Footnotes

**Operating Temperature** Specification applicable to non-terminated bulk fiber cable



## 760229518 | P-012-DZ-5G-FSULM



LazrSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 12 fiber single-unit

### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | Latin America | Middle East/Africa | North

America

Portfolio CommScope®

**Product Type** Fiber indoor cable

General Specifications

Armor Type Interlocking aluminum

Cable TypeDistributionConstruction TypeArmored

Fiber Type, quantity 12

Jacket Color Lime green

**Subunit Type** Gel-free

**Total Fiber Count** 12

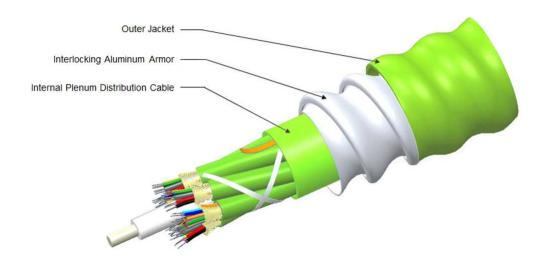
Dimensions

Diameter Over Armor10.8 mm | 0.425 inDiameter Over Jacket12.8 mm | 0.504 in

## Representative Image



## 760229518 | P-012-DZ-5G-FSULM



## Mechanical Specifications

Minimum Bend Radius, loaded192 mm7.559 inMinimum Bend Radius, unloaded128 mm5.039 inTensile Load, long term, maximum200 N | 44.962 lbfTensile Load, short term, maximum667 N | 149.948 lbf

 Compression
 85 N/mm | 485.363 lb/in

 Compression Test Method
 FOTP-41 | IEC 60794-1 E3

Flex 25 cycles

Flex Test Method FOTP-104 | IEC 60794-1 E6

**Impact** 35 N-m | 309.776 in lb

Impact Test Method FOTP-25 | IEC 60794-1 E4

**Strain** See long and short term tensile loads

Strain Test Method FOTP-33 | IEC 60794-1 E1

Twist 10 cycles

Twist Test Method FOTP-85 | IEC 60794-1 E7

**Vertical Rise, maximum** 136 m | 446.194 ft

Optical Specifications

Fiber Type OM5, LazrSPEED® wideband | OM5, LazrSPEED® wideband

## **Environmental Specifications**

**Installation temperature** 0 °C to +70 °C (+32 °F to +158 °F)

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## 760229518 | P-012-DZ-5G-FSULM

**Operating Temperature**  $-20 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \left(-4 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F}\right)$ 

**Storage Temperature**  $-40 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \text{ (-40 }^{\circ}\text{F to } +158 \,^{\circ}\text{F)}$ 

Cable Qualification Standards ANSI/ICEA S-83-596 | Telcordia GR-409

Environmental Space Plenum

Flame Test Listing NEC OFCP (ETL) and c(ETL)

Flame Test Method NFPA 130 | NFPA 262

### **Environmental Test Specifications**

**Heat Age**  $-20 \, ^{\circ}\text{C} \text{ to } +85 \, ^{\circ}\text{C} \, (-4 \, ^{\circ}\text{F to } +185 \, ^{\circ}\text{F})$ 

**Heat Age Test Method** IEC 60794-1 F9

**Low High Bend**  $-20 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-4 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

**Low High Bend Test Method** FOTP-37 | IEC 60794-1 E11

**Temperature Cycle** -20 °C to +70 °C (-4 °F to +158 °F)

**Temperature Cycle Test Method** FOTP-3 | IEC 60794-1 F1

Packaging and Weights

**Cable weight** 151 kg/km | 101.467 lb/kft

### Regulatory Compliance/Certifications

#### Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant



#### Included Products

CS-5G-TB - LazrSPEED® OM5 WideBand Multimode

Fiber

### \* Footnotes

**Operating Temperature** Specification applicable to non-terminated bulk fiber cable



## 760229534 | P-024-DZ-5G-FSULM



LazrSPEED® Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit

### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | Latin America | Middle East/Africa | North

America

Portfolio CommScope®

**Product Type** Fiber indoor cable

General Specifications

Armor Type Interlocking aluminum

Cable TypeDistributionConstruction TypeArmored

Fiber Type, quantity 24

Jacket Color Lime green

Subunit Type Gel-free

Total Fiber Count 24

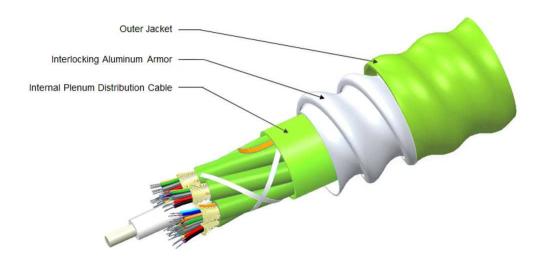
**Dimensions** 

Diameter Over Armor13.34 mm0.525 inDiameter Over Jacket17.4 mm0.685 in

Representative Image



## 760229534 | P-024-DZ-5G-FSULM



## Mechanical Specifications

Minimum Bend Radius, loaded261 mm | 10.276 inMinimum Bend Radius, unloaded174 mm | 6.85 inTensile Load, long term, maximum400 N | 89.924 lbfTensile Load, short term, maximum1335 N | 300.12 lbf

 Compression
 85 N/mm | 485.363 lb/in

 Compression Test Method
 FOTP-41 | IEC 60794-1 E3

Flex 25 cycles

Flex Test Method FOTP-104 | IEC 60794-1 E6

**Impact** 35 N-m | 309.776 in lb

Impact Test Method FOTP-25 | IEC 60794-1 E4

**Strain** See long and short term tensile loads

Strain Test Method FOTP-33 | IEC 60794-1 E1

Twist 10 cycles

Twist Test Method FOTP-85 | IEC 60794-1 E7

**Vertical Rise, maximum** 133 m | 436.352 ft

Optical Specifications

Fiber Type Composite MM | OM3, LazrSPEED® 300 | OM5, LazrSPEED® wideband | OM5,

LazrSPEED® wideband

## **Environmental Specifications**



# 760229534 | P-024-DZ-5G-FSULM

Installation temperature 0 °C to +70 °C (+32 °F to +158 °F)

**Operating Temperature**  $-20 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-4 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

**Storage Temperature**  $-40 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

Cable Qualification Standards ANSI/ICEA S-83-596 | Telcordia GR-409

Environmental Space Plenum

Flame Test Listing NEC OFCP (ETL) and c(ETL)

Flame Test Method NFPA 130 | NFPA 262

## **Environmental Test Specifications**

**Heat Age**  $-20 \,^{\circ}\text{C}$  to  $+85 \,^{\circ}\text{C}$   $(-4 \,^{\circ}\text{F}$  to  $+185 \,^{\circ}\text{F})$ 

**Heat Age Test Method** IEC 60794-1 F9

**Low High Bend**  $-20 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-4 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

**Low High Bend Test Method** FOTP-37 | IEC 60794-1 E11

**Temperature Cycle** -20 °C to +70 °C (-4 °F to +158 °F)

**Temperature Cycle Test Method** FOTP-3 | IEC 60794-1 F1

Packaging and Weights

**Cable weight** 307 kg/km | 206.294 lb/kft

## Regulatory Compliance/Certifications

## Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant



#### Included Products

CS-5G-TB - LazrSPEED® OM5 WideBand Multimode

Fiber

#### \* Footnotes

**Operating Temperature** Specification applicable to non-terminated bulk fiber cable





TeraSPEED® Indoor/Outdoor Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 12 fiber single-unit

#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | Latin America | Middle East/Africa | North

America

Portfolio CommScope®

Product Type Fiber indoor/outdoor cable

General Specifications

Armor Type Interlocking aluminum

 Cable Type
 Distribution

Construction Type Armored

Fiber Type, quantity 12

Jacket Color Black

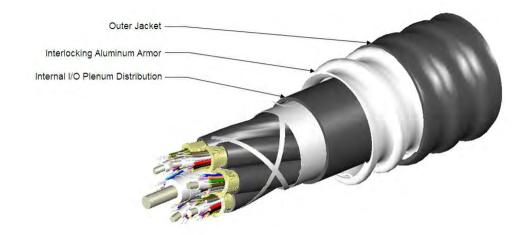
**Total Fiber Count** 12

**Dimensions** 

Diameter Over Armor12.07 mm | 0.475 inDiameter Over Jacket14.1 mm | 0.555 in

Representative Image





## Mechanical Specifications

Minimum Bend Radius, loaded211 mm | 8.307 inMinimum Bend Radius, unloaded141 mm | 5.551 inTensile Load, long term, maximum400 N | 89.924 lbfTensile Load, short term, maximum1335 N | 300.12 lbf

 Compression
 85 N/mm | 485.363 lb/in

 Compression Test Method
 FOTP-41 | IEC 60794-1 E3

Flex 25 cycles

Flex Test Method FOTP-104 | IEC 60794-1 E6

**Impact** 35 N-m | 309.776 in lb

Impact Test Method FOTP-25 | IEC 60794-1 E4

**Strain** See long and short term tensile loads

Strain Test Method FOTP-33 | IEC 60794-1 E1

Twist 10 cycles

Twist Test Method FOTP-85 | IEC 60794-1 E7

Vertical Rise, maximum 211 m | 692.257 ft

Optical Specifications

Fiber Type G.652.D and G.657.A1, TeraSPEED® | G.652.D and G.657.A1, TeraSPEED®

## **Environmental Specifications**



Page 2 of 4

Installation temperature-30 °C to +70 °C (-22 °F to +158 °F)Operating Temperature-40 °C to +70 °C (-40 °F to +158 °F)

**Storage Temperature**  $-40 \,^{\circ}\text{C} \text{ to } +75 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +167 \,^{\circ}\text{F})$ 

Cable Qualification Standards ANSI/ICEA S-104-696 | Telcordia GR-20 (water penetration for internal

cable) | Telcordia GR-409

Environmental Space Plenum

Flame Test Listing NEC OFCP (ETL) and c(ETL)
Flame Test Method NFPA 130 | NFPA 262

Jacket UV Resistance UV stabilized

Water Penentration 24 h

**Water Penentration Test Method** FOTP-82 | IEC 60794-1 F5

**Environmental Test Specifications** 

Cable Freeze Test Method IEC 60794-1 F15

**Heat Age**  $-40 \,^{\circ}\text{C} \text{ to } +85 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +185 \,^{\circ}\text{F})$ 

**Heat Age Test Method** IEC 60794-1 F9

**Low High Bend**  $-40 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

**Low High Bend Test Method** FOTP-37 | IEC 60794-1 E11

Temperature Cycle -40 °C to +70 °C (-40 °F to +158 °F)

**Temperature Cycle Test Method** FOTP-3 | IEC 60794-1 F1

Packaging and Weights

**Cable weight** 194 kg/km | 130.362 lb/kft

Regulatory Compliance/Certifications

Agency Classification

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system



#### Included Products

CS-8W-TB - TeraSPEED® Singlemode Fiber

\* Footnotes

**Operating Temperature** Specification applicable to non-terminated bulk fiber cable

Page 3 of 4



TeraSPEED® Indoor/Outdoor Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit

#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | Latin America | Middle East/Africa | North

America

Portfolio CommScope®

Product Type Fiber indoor/outdoor cable

General Specifications

Armor Type Interlocking aluminum

Cable TypeDistribution

Construction Type Armored

Fiber Type, quantity 24

Jacket Color Black

Total Fiber Count 24

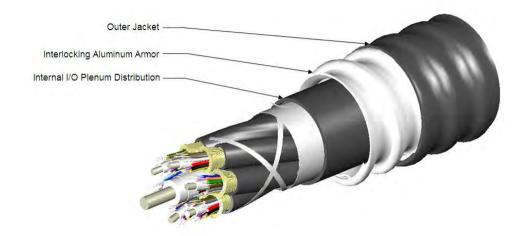
**Dimensions** 

Diameter Over Armor 13.34 mm | 0.525 in

**Diameter Over Jacket** 15.4 mm | 0.606 in

Representative Image





## Mechanical Specifications

Minimum Bend Radius, loaded231 mm | 9.094 inMinimum Bend Radius, unloaded154 mm | 6.063 inTensile Load, long term, maximum400 N | 89.924 lbfTensile Load, short term, maximum1335 N | 300.12 lbf

 Compression
 85 N/mm | 485.363 lb/in

 Compression Test Method
 FOTP-41 | IEC 60794-1 E3

Flex 25 cycles

Flex Test Method FOTP-104 | IEC 60794-1 E6

**Impact** 35 N-m | 309.776 in lb

Impact Test Method FOTP-25 | IEC 60794-1 E4

**Strain** See long and short term tensile loads

Strain Test Method FOTP-33 | IEC 60794-1 E1

Twist 10 cycles

Twist Test Method FOTP-85 | IEC 60794-1 E7

**Vertical Rise, maximum** 187 m | 613.517 ft

**Optical Specifications** 

Fiber Type G.652.D and G.657.A1, TeraSPEED® | G.652.D and G.657.A1, TeraSPEED®

## **Environmental Specifications**



Installation temperature-30 °C to +70 °C (-22 °F to +158 °F)Operating Temperature-40 °C to +70 °C (-40 °F to +158 °F)

**Storage Temperature**  $-40 \,^{\circ}\text{C} \text{ to } +75 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +167 \,^{\circ}\text{F})$ 

Cable Qualification Standards ANSI/ICEA S-104-696 | Telcordia GR-20 (water penetration for internal

cable) | Telcordia GR-409

Environmental Space Plenum

Flame Test Listing NEC OFCP (ETL) and c(ETL)
Flame Test Method NFPA 130 | NFPA 262

Jacket UV Resistance UV stabilized

Water Penentration 24 h

Water Penentration Test Method FOTP-82 | IEC 60794-1 F5

**Environmental Test Specifications** 

Cable Freeze Test Method IEC 60794-1 F15

**Heat Age**  $-40 \,^{\circ}\text{C} \text{ to } +85 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +185 \,^{\circ}\text{F})$ 

**Heat Age Test Method** IEC 60794-1 F9

**Low High Bend** -40 °C to +70 °C (-40 °F to +158 °F)

**Low High Bend Test Method** FOTP-37 | IEC 60794-1 E11

**Temperature Cycle**  $-40 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

**Temperature Cycle Test Method** FOTP-3 | IEC 60794-1 F1

Packaging and Weights

**Cable weight** 218 kg/km | 146.489 lb/kft

Regulatory Compliance/Certifications

Agency Classification

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system



#### Included Products

CS-8W-TB - TeraSPEED® Singlemode Fiber

#### \* Footnotes

**Operating Temperature** Specification applicable to non-terminated bulk fiber cable

Page 3 of 4





# 760238363 | P-012-LZ-5G-F12BK/25D



LazrSPEED® Indoor/Outdoor, Plenum Rated, Gel-Free, Stranded Loose Tube Cable with Aluminum Interlocking Armor containing a Plenum Rated Outer Jacket

#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | Latin America | Middle East

/Africa | North America

Portfolio CommScope®

Product Type Fiber indoor/outdoor cable

General Specifications

Armor Type Interlocking aluminum

Cable Type Stranded loose tube

Construction Type Armored

Fiber Type, quantity 12

Fibers per Subunit, quantity 12

Filler, quantity 4

Jacket Color Black

Subunit Type Gel-free

Subunit, quantity 1

Total Fiber Count 12

Dimensions

**Buffer Tube/Subunit Diameter** 2.5 mm | 0.098 in

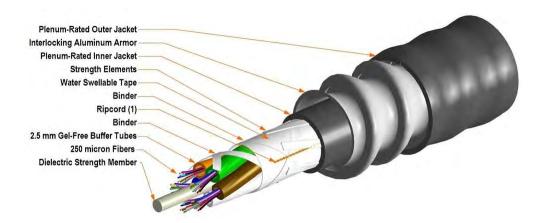
**Diameter Over Armor** 15.9 mm | 0.626 in

**Diameter Over Jacket** 17.9 mm | 0.705 in

Representative Image



# 760238363 | P-012-LZ-5G-F12BK/25D



#### Mechanical Specifications

Minimum Bend Radius, loaded 358 mm | 14.094 in

Minimum Bend Radius, unloaded 250 mm | 9.843 in

**Tensile Load, long term, maximum** 400 N | 89.924 lbf

Tensile Load, short term, maximum 1335 N | 300.12 lbf

**Compression** 85 N/mm | 485.363 lb/in

Compression Test Method FOTP-41 | IEC 60794-1 E3

Flex 25 cycles

FIex Test Method FOTP-104 | IEC 60794-1 E6

**Impact** 35 N-m | 309.776 in lb

Impact Test Method FOTP-25 | IEC 60794-1 E4

**Strain** See long and short term tensile loads

Strain Test Method FOTP-33 | IEC 60794-1 E1

Twist 10 cycles

Twist Test Method FOTP-85 | IEC 60794-1 E7

**Vertical Rise, maximum** 144 m | 472.441 ft

Optical Specifications

Fiber Type OM5, LazrSPEED® wideband | OM5, LazrSPEED® wideband

## **Environmental Specifications**

Installation temperature  $-30 \,^{\circ}\text{C}$  to  $+70 \,^{\circ}\text{C}$  (-22  $^{\circ}\text{F}$  to  $+158 \,^{\circ}\text{F}$ )

Operating Temperature  $-40 \,^{\circ}\text{C}$  to  $+70 \,^{\circ}\text{C}$  (-40  $^{\circ}\text{F}$  to  $+158 \,^{\circ}\text{F}$ )

Page 2 of 3



## 760238363 | P-012-LZ-5G-F12BK/25D

Storage Temperature  $-40 \,^{\circ}\text{C}$  to  $+75 \,^{\circ}\text{C}$  ( $-40 \,^{\circ}\text{F}$  to  $+167 \,^{\circ}\text{F}$ )

Cable Qualification Standards ANSI/ICEA S-104-696 | EN 187105 | Telcordia GR-409

Environmental Space Plenum

Flame Test Listing

NEC OFCP (ETL) and c(ETL)

Flame Test Method

NFPA 130 | NFPA 262

Jacket UV Resistance UV stabilized

Water Penentration 24 h

Water Penentration Test Method FOTP-82 | IEC 60794-1 F5

**Environmental Test Specifications** 

Cable Freeze -2 °C | 28.4 °F

Cable Freeze Test Method FOTP-98 | IEC 60794-1 F15

**Heat Age** -40 °C to +85 °C (-40 °F to +185 °F)

Heat Age Test Method IEC 60794-1 F9

**Low High Bend**  $-30 \,^{\circ}\text{C} \text{ to } +60 \,^{\circ}\text{C} \, (-22 \,^{\circ}\text{F to } +140 \,^{\circ}\text{F})$ 

**Low High Bend Test Method** FOTP-37 | IEC 60794-1 E11

**Temperature Cycle**  $-40 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \text{ (-40 }^{\circ}\text{F to } +158 \,^{\circ}\text{F)}$ 

**Temperature Cycle Test Method** FOTP-3 | IEC 60794-1 F1

Packaging and Weights

**Cable weight** 283 kg/km | 190.167 lb/kft

Regulatory Compliance/Certifications

Agency Classification

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system



#### Included Products

CS-5G-LT – LazrSPEED® OM5 WideBand Multimode

Fiber

\* Footnotes

**Operating Temperature** Specification applicable to non-terminated bulk fiber cable





LazrSPEED® Indoor/Outdoor Plenum Distribution Cable, interlocking aluminum armored with plenum jacket, 24 fiber single-unit

#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | Latin America | Middle East/Africa | North

America

Portfolio CommScope®

Product Type Fiber indoor/outdoor cable

General Specifications

Armor Type Interlocking aluminum

Cable TypeDistribution

Construction Type Armored

Fiber Type, quantity 24

Jacket Color Black

Total Fiber Count 24

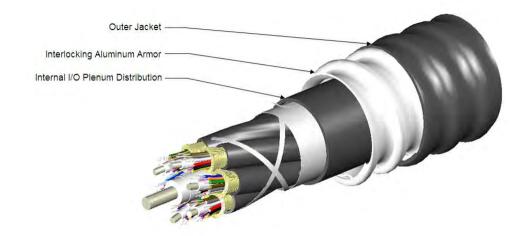
**Dimensions** 

Diameter Over Armor 13.34 mm | 0.525 in

**Diameter Over Jacket** 15.4 mm | 0.606 in

Representative Image





## Mechanical Specifications

Minimum Bend Radius, loaded231 mm | 9.094 inMinimum Bend Radius, unloaded154 mm | 6.063 inTensile Load, long term, maximum400 N | 89.924 lbfTensile Load, short term, maximum1335 N | 300.12 lbf

 Compression
 85 N/mm | 485.363 lb/in

 Compression Test Method
 FOTP-41 | IEC 60794-1 E3

Flex 25 cycles

Flex Test Method FOTP-104 | IEC 60794-1 E6

**Impact** 35 N-m | 309.776 in lb

Impact Test Method FOTP-25 | IEC 60794-1 E4

**Strain** See long and short term tensile loads

Strain Test Method FOTP-33 | IEC 60794-1 E1

Twist 10 cycles

Twist Test Method FOTP-85 | IEC 60794-1 E7

**Vertical Rise, maximum** 187 m | 613.517 ft

**Optical Specifications** 

**Fiber Type** OM5, LazrSPEED® wideband

## **Environmental Specifications**



Installation temperature  $-30 \,^{\circ}\text{C}$  to  $+70 \,^{\circ}\text{C}$  (-22  $^{\circ}\text{F}$  to  $+158 \,^{\circ}\text{F}$ )

Operating Temperature  $-25 \,^{\circ}\text{C}$  to  $+70 \,^{\circ}\text{C}$  (-13  $^{\circ}\text{F}$  to  $+158 \,^{\circ}\text{F}$ )

**Storage Temperature**  $-40 \,^{\circ}\text{C} \text{ to } +75 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +167 \,^{\circ}\text{F})$ 

Cable Qualification Standards ANSI/ICEA S-104-696 | Telcordia GR-20 (water penetration for internal

cable) | Telcordia GR-409

Environmental Space Plenum

Flame Test Listing NEC OFCP (ETL) and c(ETL)
Flame Test Method NFPA 130 | NFPA 262

Jacket UV Resistance UV stabilized

Water Penentration 24 h

Water Penentration Test Method FOTP-82 | IEC 60794-1 F5

**Environmental Test Specifications** 

Cable Freeze Test Method IEC 60794-1 F15

**Heat Age**  $-40 \,^{\circ}\text{C} \text{ to } +85 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +185 \,^{\circ}\text{F})$ 

**Heat Age Test Method** IEC 60794-1 F9

**Low High Bend**  $-40 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

**Low High Bend Test Method** FOTP-37 | IEC 60794-1 E11

**Temperature Cycle**  $-40 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

**Temperature Cycle Test Method** FOTP-3 | IEC 60794-1 F1

Packaging and Weights

**Cable weight** 218 kg/km | 146.489 lb/kft

Regulatory Compliance/Certifications

Agency Classification

CHINA-ROHS Below maximum concentration value

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant



#### Included Products

CS-5G-TB - LazrSPEED® OM5 WideBand Multimode

Fiber



\* Footnotes

**Operating Temperature** Specification applicable to non-terminated bulk fiber cable

# 760237992 | EHD12-DM-24LC-SM-B-ULL



EHD ULL Singlemode MPO-12 distribution module, 24LC to 2x12f MPOs unpinned, dust plugs

#### **Product Classification**

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

PortfolioCommScope®Product TypeFiber moduleProduct BrandSYSTIMAX ULL

Product Series EHD

## General Specifications

Color, frontBlueColor, rearGrayInterface, frontLCInterface Feature, frontUPC

Interface, rear MPO Unpinned

**Interface Feature, rear** Key up/up

Polarity Method B Enhanced (ULL)

Shuttered No Total Fibers, quantity 24

#### Dimensions

 Height
 12.45 mm | 0.49 in

 Width
 169.67 mm | 6.68 in

 Depth
 115.32 mm | 4.54 in

## **Optical Specifications**

Fiber Mode Singlemode



# 760237992 | EHD12-DM-24LC-SM-B-ULL

Fiber Type OS2
Insertion Loss, maximum 0.6 dB

## **Environmental Specifications**

Qualification Standards IEC 61753-1 | TIA-568.3-D

Safety Standard CE | CSA | UL

## Packaging and Weights

Packaging quantity 1

**Weight, net** 0.136 kg | 0.3 lb

## Regulatory Compliance/Certifications

#### Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant





# 760238000 | EHD24-DM-24LC-WB-B-ULL



EHD ULL Multimode OM5 Wideband MPO-24 distribution module, 24LC to 1x24f MPOs unpinned, dust plugs

#### **Product Classification**

Regional Availability Asia | Australia/New Zealand | EMEA | Latin America | North America

PortfolioCommScope®Product TypeFiber moduleProduct BrandSYSTIMAX ULL

Product Series EHD

## General Specifications

Color, front Lime green

Color, rear Gray
Interface, front LC

Interface Feature, front Standard

Interface, rear MPO Unpinned

**Interface Feature, rear** Key up/up

Polarity Method B Enhanced (ULL)

Shuttered No Total Fibers, quantity 24

#### Dimensions

 Height
 12.45 mm | 0.49 in

 Width
 169.67 mm | 6.68 in

 Depth
 115.32 mm | 4.54 in

## **Optical Specifications**

**Fiber Mode** Multimode

**COMMSCOPE®** 

# 760238000 | EHD24-DM-24LC-WB-B-ULL

Fiber Type OM5, LazrSPEED® wideband

**Insertion Loss, maximum** 0.35 dB

## **Environmental Specifications**

**Qualification Standards** IEC 61753-1 | TIA-568.3-D

Safety Standard CE | CSA | UL

#### Packaging and Weights

Packaging quantity 1

**Weight, net** 0.136 kg | 0.3 lb

## Regulatory Compliance/Certifications

#### Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant





# 760243371 | MFC-LCF-20-5Y-12-PACK



Qwik-Fuse Connector, LC, OM3/OM4/OM5, Aqua, for 1.6/2.0 mm, 12 per pack

#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | EMEA | Latin America | North America

PortfolioCommScope®Product TypeFiber connector

Product Brand LazrSPEED® | Qwik

**Product Series** Qwik-Fuse

General Specifications

Body StyleCordageColor, bootAquaColor, housingAqua

Ferrule Geometry Factory polished

**Interface** LC

Interface Feature Field Installable | Fusion splice

**Dimensions** 

**Compatible Cable Diameter** 1.6 mm | 0.063 in | 2 mm | 0.079 in

Material Specifications

Ferrule Material Zirconia

Mechanical Specifications

Cable Retention Strength, maximum 5.08 lb @ 0 °

**Optical Specifications** 

**Fiber Mode** Multimode



# 760243371 | MFC-LCF-20-5Y-12-PACK

Fiber Type OM3 | OM4 | OM5, LazrSPEED® wideband

**Optical Components Standard** ANSI/TIA-568. 3-D | IEC 61753-1

Insertion Loss, maximum0.25 dBInsertion Loss, typical0.1 dBReturn Loss, minimum30 dB

#### **Environmental Specifications**

**Operating Temperature**  $-40 \,^{\circ}\text{C} \text{ to } +70 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F to } +158 \,^{\circ}\text{F})$ 

Packaging and Weights

Packaging quantity 12

## Regulatory Compliance/Certifications

#### Agency Classification

CHINA-ROHS Below maximum concentration value

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

REACH-SVHC Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS Compliant





## 760243372 | SFC-LCF-09-8Y-12-PACK

Qwik-Fuse Connector, LC, SM-UPC, Blue, for 250µm/900µm, 12 per pack



#### **Product Classification**

Regional Availability

Asia | Australia/New Zealand | EMEA | Latin America | North America

Portfolio CommScope®
Product Type Fiber connector

Product Brand Qwik | TeraSPEED®

**Product Series** Qwik-Fuse

General Specifications

Body Style BTW
Color, boot Blue
Color, housing Blue

Ferrule Geometry Factory polished

**Interface** LC

Interface Feature Field Installable | Fusion splice | UPC

**Dimensions** 

**Compatible Cable Diameter** 0.25 mm | 0.01 in | 0.9 mm | 0.035 in

Material Specifications

Ferrule Material Zirconia

Mechanical Specifications

Cable Retention Strength, maximum 0.74 lb @ 0  $^{\circ}$  | 1.03 lb @ 0  $^{\circ}$ 

Optical Specifications

**Fiber Mode** Singlemode







# APPENDIX E.5: HAMMOND 4-POST SEISMIC RACK, WALL-MOUNT CABINET & CABLE MANAGER PART NUMBERS

Version 01

January 2023

Hammond Parts Version 01

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PHSA 1

Hammond Parts Version 01

#### 1. 4-post Seismic Adjustable Rack

- 1.1. Special DRZ477 (44U) Seismic Relay Rack SR1701650
- 1.2. Adjustable Bottom Shelf
  - 1.2.1. SR1702607 Adjustable from 28" TO 39"
  - 1.2.2. SR1702608 Adjustable from 36" TO 48"
- 1.3. Adjustable Top Brackets
  - 1.3.1. SR1702605 Adjustable from 28" TO 39"
  - 1.3.2. SR1702606 Adjustable from 36" TO 48"

#### 2. Wall-mount Cabinet Assembly

- 2.1. Wall-mount Cabinet Assembly SR1803819
  - 2.1.1. Door
    - 2.1.1.1. Tinted HWCWD3027UBK
    - 2.1.1.2. Ventilated HWCVD3027UBK
    - 2.1.1.3. Solid HWCSD3027UBK
  - 2.1.2. Vertical Managers on left and right sides RB-HFM1
  - 2.1.3. 19" Mounting Rails 2nd set of mounting rails at the rear URR27U
  - 2.1.4. Fan Kit 2-Fans/Guards & Cords DNFK2AC120
  - 2.1.5. Thermostat Stat. Celsius Scale SKT011419NO

## 3. Vertical Managers High-Density Vertical Finger Manager with Slam-Latching Door

- 3.1. VFMMD6BK
- 3.2. VFMMD8BK
- 3.3. VFMMD10BK
- 3.4. VFMMD12BK

PHSA 2

Hammond Parts Version 01

## 4. Horizontal Finger Cable Manager

4.1. RB-HFMD2

## 5. Hammond Product Data Sheets

PHSA 3

REV **ECN** DESCRIPTION **APPROVED:** N/A SUBMITTAL JUL 20/17 4x ∅ 0.28 DATE: ADJUSTABLE DEPTH ADJUSTABLE TOP BRACKETS 28" TO 48" SR1702605 ADJUSTABLE FROM 28" TO 39" SR1702606 ADJUSTABLE FROM 36" TO 48" SR1701650 - SEISMIC Adjustable Relay Rack Assembly Assembly Includes: #10-32 - Two **DRZ477** - Zone 4 certified 44U Seismic relay racks, welded steel construction. **GROUND STUDS** - Dynamic (SEISMIC) suggested load capacity of 800lb of equipment installed plus 50lb overhead, when secured using C4K-Z4 seismic bolt down kit. - UL rated (STATIC) load capacity of 2000lb when secured using C4K-Z4 seismic bolt down kit. MOUNTING CHANNELS - Rack provides stanard 19" mounting with 44 usable rack mount units TAPPED # 10-32 FRONT AND REAR - Mounting channels and top made of 10ga.CRS, Bottom mounting feet made of 0.312 angle iron <u>84.00</u> - EIA-310-D tapped #10-32 front and rear rails with 19" mounting. - Includes two (2) pairs of #10-32 ground studs, spaced 5/8" apart with Earth Grounding labels. Stud pairs are located across from each other inside the rail channel and on the front mounting foot. - Top bracket mounting holes compatible with top cable access ories. - Large base for freestanding support of equipment. Ø 0.375-Rack is finished in smooth black powder paint, #10-32 equipment mounting hardware included. SR1702609 SR1702605 - top adjustable bracket pair 28" to 39" finished in smooth black powder paint 44 U-MARKING LABEL (1U TOP TO 44U BOTTOM) SR1702606 - top adjustable bracket pair 36" to 48" finished in smooth black powder paint SR1702607 - bottom adjustable shelf 28" to 39" finished in smooth black powder paint #10-32 **GROUND STUDS** SR1702608 - bottom adjustable shelf 36" to 48" finished in smooth black powder paint 18.00 **BOTTOM ANGLE** SR1702609 - four 44U marking labels, U1 starting at the top, U44 at the bottom. PART No. SR1701650 **⚠** HAMMOND MANUFACTURING CO. LTD SHEET ahalliday DWN 22.50 SIZE ADJUSTABLE BOTTOM SHELF Enclosure Group DATE 19-Jul-17 В SR1702607 ADJUSTABLE FROM 28" TO 39" THIS DRAWING IS PROPRIETARY INFORMATION OF UNLESS OTHERWISE SPECIFIED SR1702608 ADJUSTABLE FROM 36" TO 48" ALL DIMENSIONS ARE SHOWN IN INCHES. HAMMOND MFG. CO. LTD. NOT TO BE USED WITHOUT EXPRESSED CHK. WRITTEN PERMISSION OF HAMMOND MFG. CO. LTD. TOLERANCES - UNLESS OTHERWISE INDICATED: **AUTH** DIMENSION UNDER 6" 6" TO 24" OVER 24" OVER 48" SPECIAL DRZ477 (44U) SEISMIC ± 1/32" ± 3/64" ± 1/16" ± 1/8" SHOWN ASSEMBLED FOR REF. ONLY MAT'L SEE COMPONENTS RELAY RACK ASSEMBLY ± 0.06" ± 0.04" ± 0.05" ± 0.13" SHIPPED UNASSEMBLED .XXX ± 0.020" ± 0.020" ± 0.020" ± 0.030" CAD DATA ONLY: DO NOT MANUALLY HOLE Ø ± 0.005" SR1701650 SCALE: 1:12 DWG: UPDATE ANGLE

DWG:

SR1701650

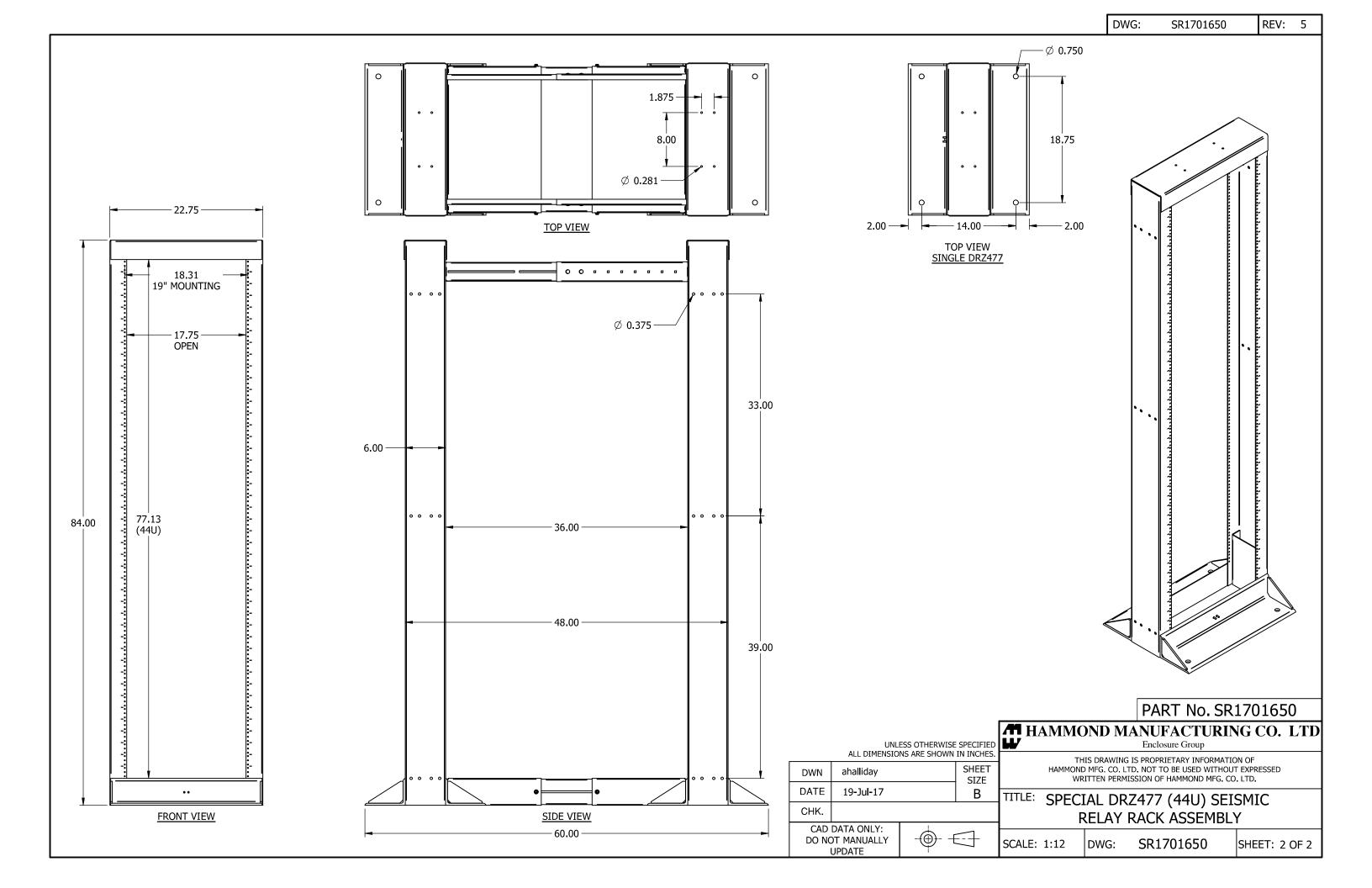
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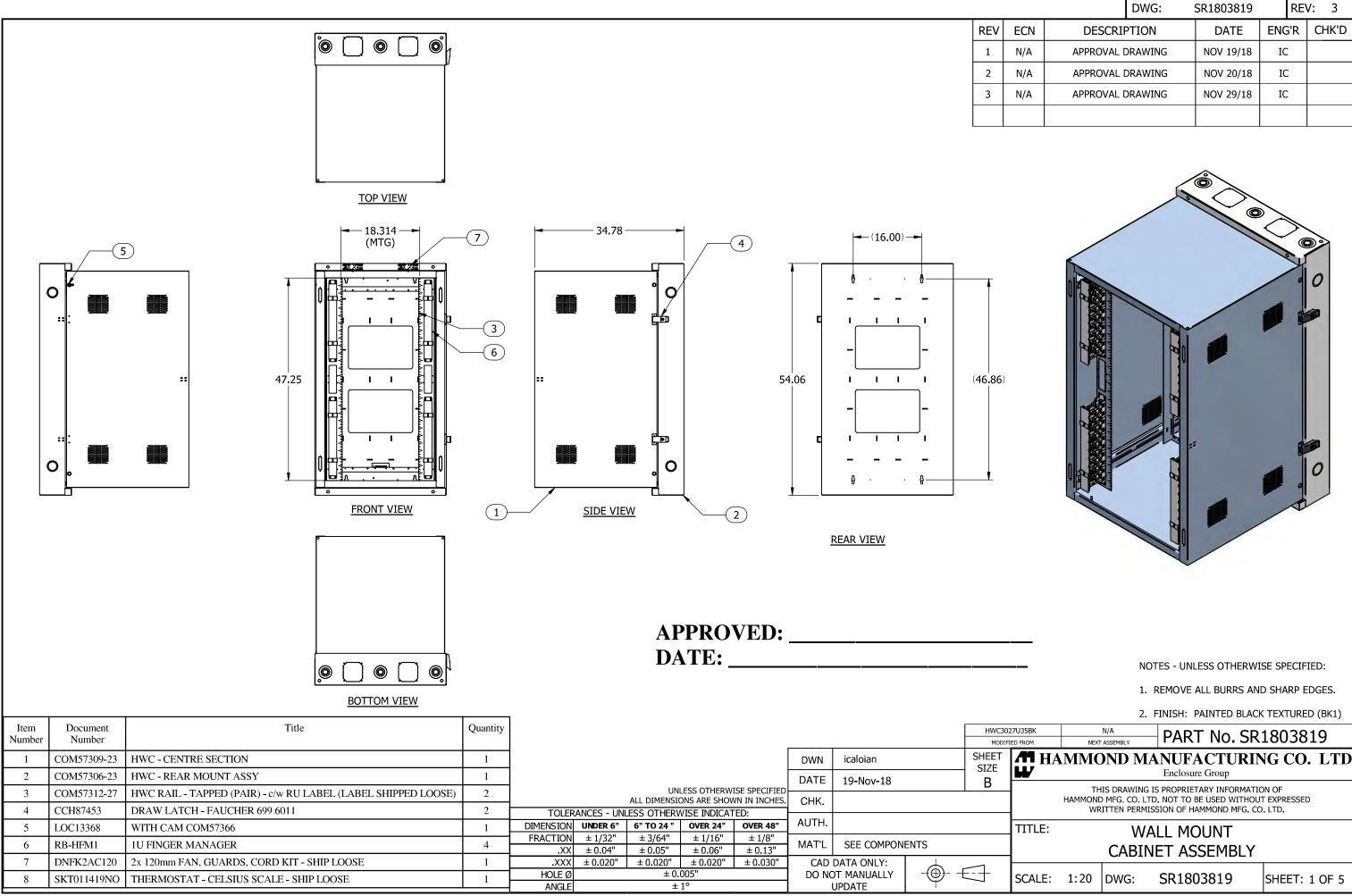
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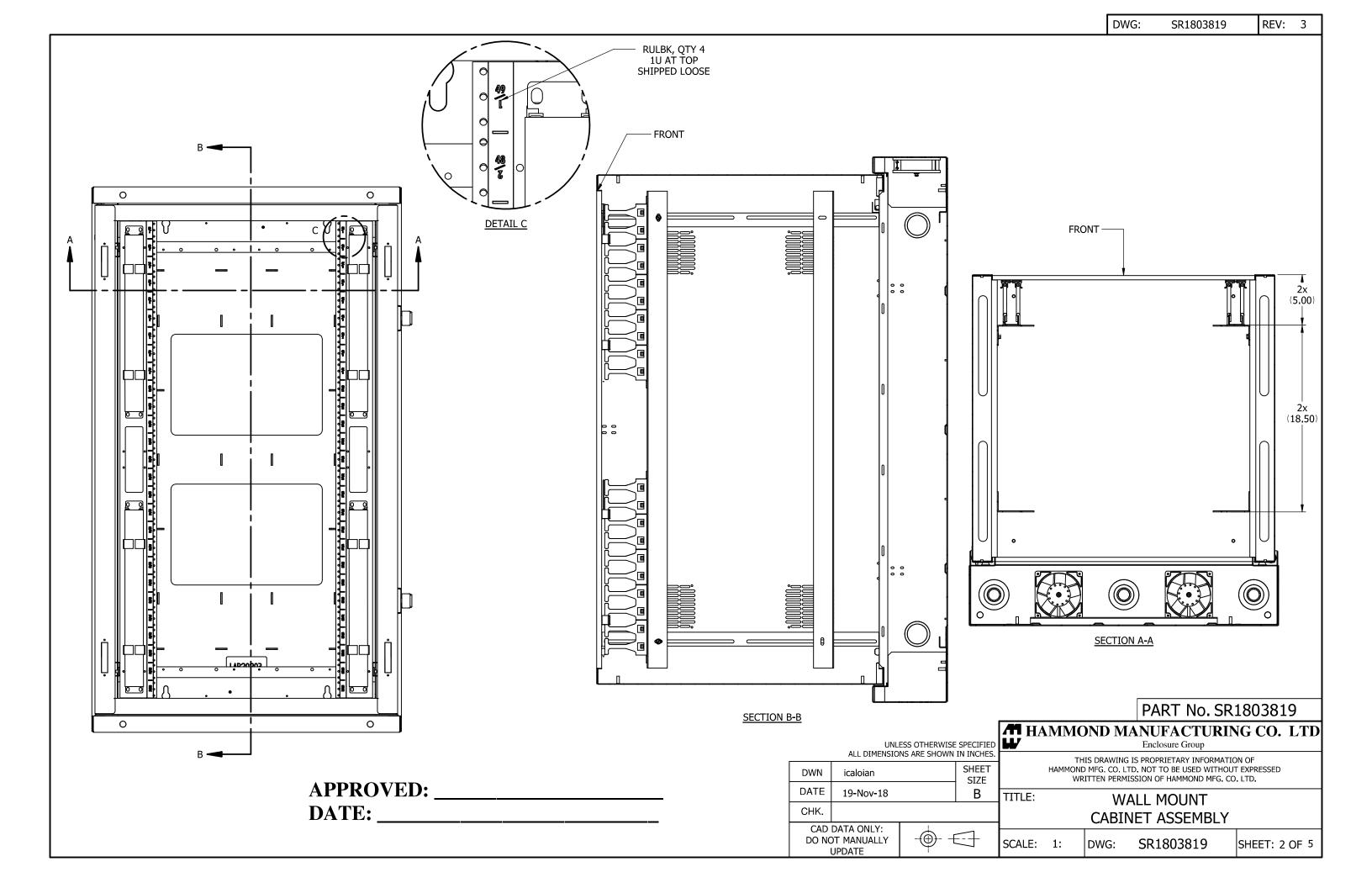
SHEET: 1 OF 2

**ENG'R** 

CHK'D



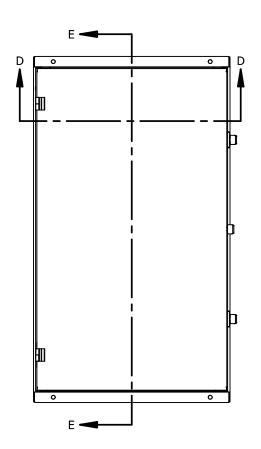


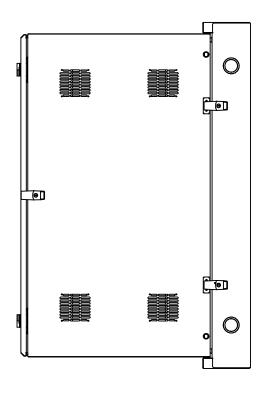


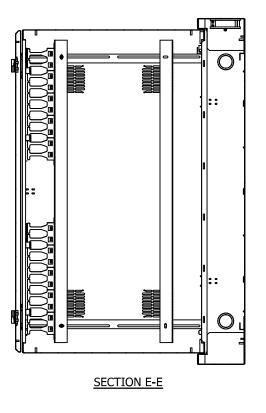
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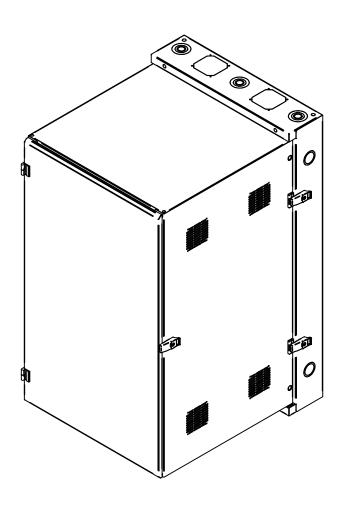
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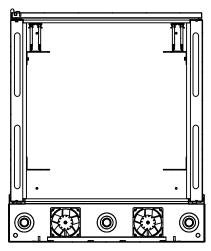
#### HWCSD3027UBK DOOR - SOLD SEPARATELY











SECTION D-D

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE SHOWN IN INCHES.

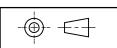
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DATE 19-Nov-18 B

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CAD DATA ONLY: DO NOT MANUALLY UPDATE



PART No. SR1803819

HAMMOND MANUFACTURING CO. LTD
Enclosure Group

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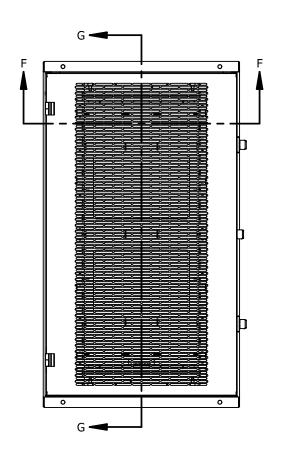
WALL MOUNT CABINET ASSEMBLY

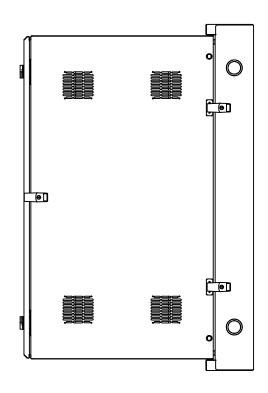
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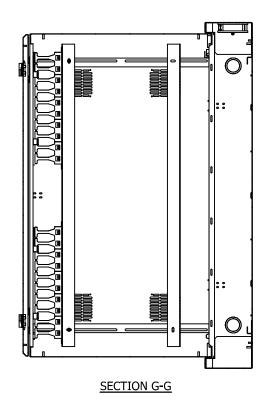
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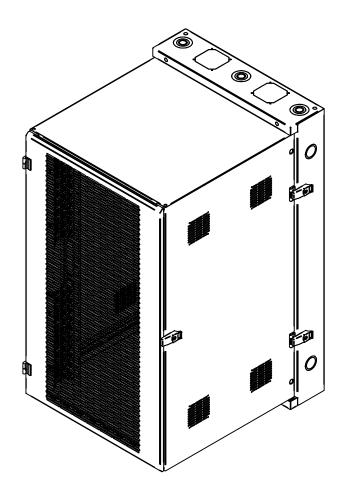
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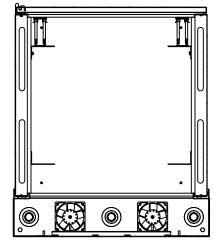
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SECTION F-F

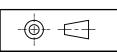
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE SHOWN IN INCHES.

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DATE 19-Nov-18 B

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CAD DATA ONLY: DO NOT MANUALLY UPDATE



PART No. SR1803819

# HAMMOND MANUFACTURING CO. LTD Enclosure Group

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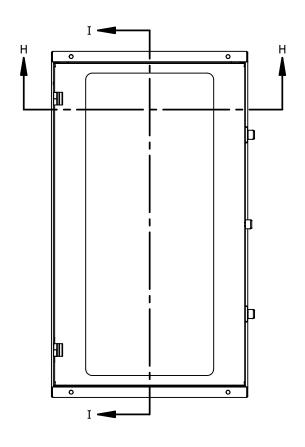
WALL MOUNT CABINET ASSEMBLY

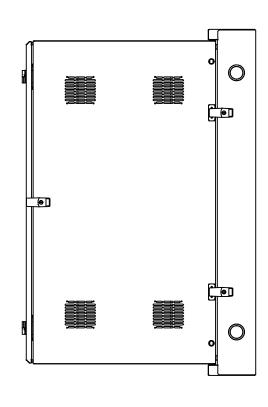
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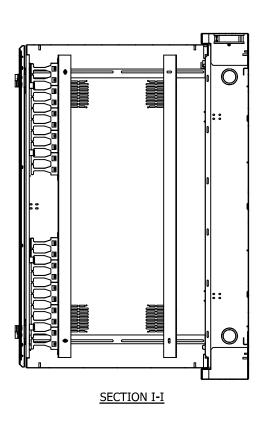
DWG: SR1803819 REV: 3

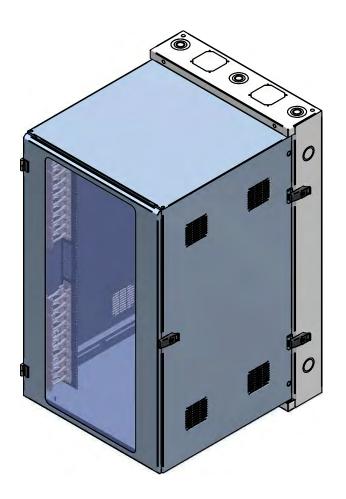
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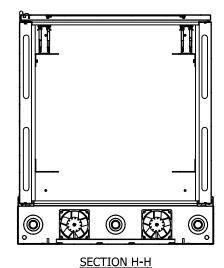
HWCWD3027UBK DOOR - SOLD SEPARATELY





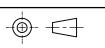






SHEET icaloian SIZE DATE В 19-Nov-18 CHK.

CAD DATA ONLY: DO NOT MANUALLY UPDATE



PART No. SR1803819 UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE SHOWN IN INCHES.

HAMMOND MANUFACTURING CO. LTD
Enclosure Group

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TITLE: WALL MOUNT **CABINET ASSEMBLY** 

SR1803819 SCALE: 1:15 DWG: SHEET: 5 OF 5

Quality Products. Service Excellence.

## High-Density Vertical Finger Manager with Slam-Latching Door VFM

Series

For use with Open Frame Racks











#### **Features**

- Sturdy, reversible steel slam-latch door/cover with pinch-trigger handle included.
- Available in 6", 8", 10" or 12" widths.
- Metal finger features sturdy T-shape steel fingers are spaced at 2RU and provide support for high-density cable bundles and heavy gauge cables. Includes clip-on plastic finger guards (shipped loose) for cable 1.25" bend radius.
- Each manager comes with two openings for cable pass-thru.
- Includes cable mounting lances for hook and loop cable organization.
- Compatible with Hammond DNRRHDW, DC4R, DRZ4, RB-2P and RB-2PA Series of open frame racks. See compatibility chart below.
  - Use the optional riser base VFMB2BK for easier installation and manager support.
  - We strongly recommend you use our **rack bolt-down kit** when mounting large cable managers.
- Optional inner and side panel, spool and cable divider accessories available.
- Finished in a textured black powder paint finish.
- TAA-compliant for GSA Schedule purchases.
- · RoHS and REACH compliant.
- · Manufactured in North America.

#### **Gallery**





#### **Accessories**

- Cable Spool
- Vertical Manager Rack Spacer Bracket
- Cable Channel Divider



**Double-Sided (Steel Fingers with Plastic Radius)** 

Part No.	Part No.	Overal	Overall Dimensions (Inches) Mounting Dimensions			Door	
Black	White	Height	Width	Depth	Units	Units Rack Units	
VFMMD6BK	VFMMD6WH	81.00	6.00	24.50	77.00	44	Yes
VFMMD8BK	VFMMD8WH	81.00	8.00	24.50	77.00	44	Yes
VFMMD10BK	VFMMD10WH	81.00	10.00	24.50	77.00	44	Yes
VFMMD12BK	VFMMD12WH	81.00	12.00	24.50	77.00	44	Yes

### **VFM Specific Accessories**

	6.00		8.00		10.00		12.00	
	Par	t No.	Part No.		Part No.		Part No.	
Description	Black	White	Black	White	Black	White	Black	White
Accessor Inner Denel	VFMAP6BK	VFMAP6WH	VFMAP8BK	VFMAP8WH	VFMAP10BK	VFMAP10WH	VFMAP12BK	VFMAP12WH
Accessory Inner Panel	VFMAP6BK	VFMAP6WH	VFMAP8BK	VFMAP8WH	VFMAP10BK	VFMAP10WH	VFMAP12BK	VFMAP12WH
Solid Inner Panel	VFMFP6BK	VFMFP6WH	VFMFP8BK	VFMFP8WH	VFMFP10BK	VFMFP10WH	VFMFP12BK	VFMFP12WH
Soliu IIIIlei Pallei	VFMFP6BK	VFMFP6WH	VFMFP8BK	VFMFP8WH	VFMFP10BK	VFMFP10WH	VFMFP12BK	VFMFP12WH
Manager End/Side Panel	VFMSPBK	VFMSPWH	VFMSPBK	VFMSPWH	VFMSPBK	VFMSPWH	VFMSPBK	VFMSPWH

### **Estimated Cable Fill Capacities**

		Recommended Cab	le Fill (50% Fill Ratio)	Maximum Cable I	Fill (100% Fill Ratio)
Part No.	Description	Cat 6 (0.25" Ø)	Cat 6a (0.30" Ø)	Cat 6 (0.25" Ø)	Cat 6a (0.30" Ø)
	Channel Opening	430	298	860	598
VFMMD6BK	Per Finger Opening	28	19	55	38
	Rear Pass Through	774	538	1548	1067
	Channel Opening	648	450	1296	900
VFMMD8BK	Per Finger Opening	28	19	55	38
	Rear Pass Through	1152	800	2302	1598
	Channel Opening	864	600	1728	1200
VFMMD10BK	Per Finger Opening	28	19	55	38
	Rear Pass Through	1526	1060	3054	2120
VFMMD12BK	Channel Opening	1080	750	2162	1502
	Per Finger Opening	28	19	55	38
	Rear Pass Through	1904	1322	3808	2644

The channel opening includes both front and rear channels. The rear opening qty is without accessory inner panels installed.

### Cable Manager > Hammond Rack Compatability

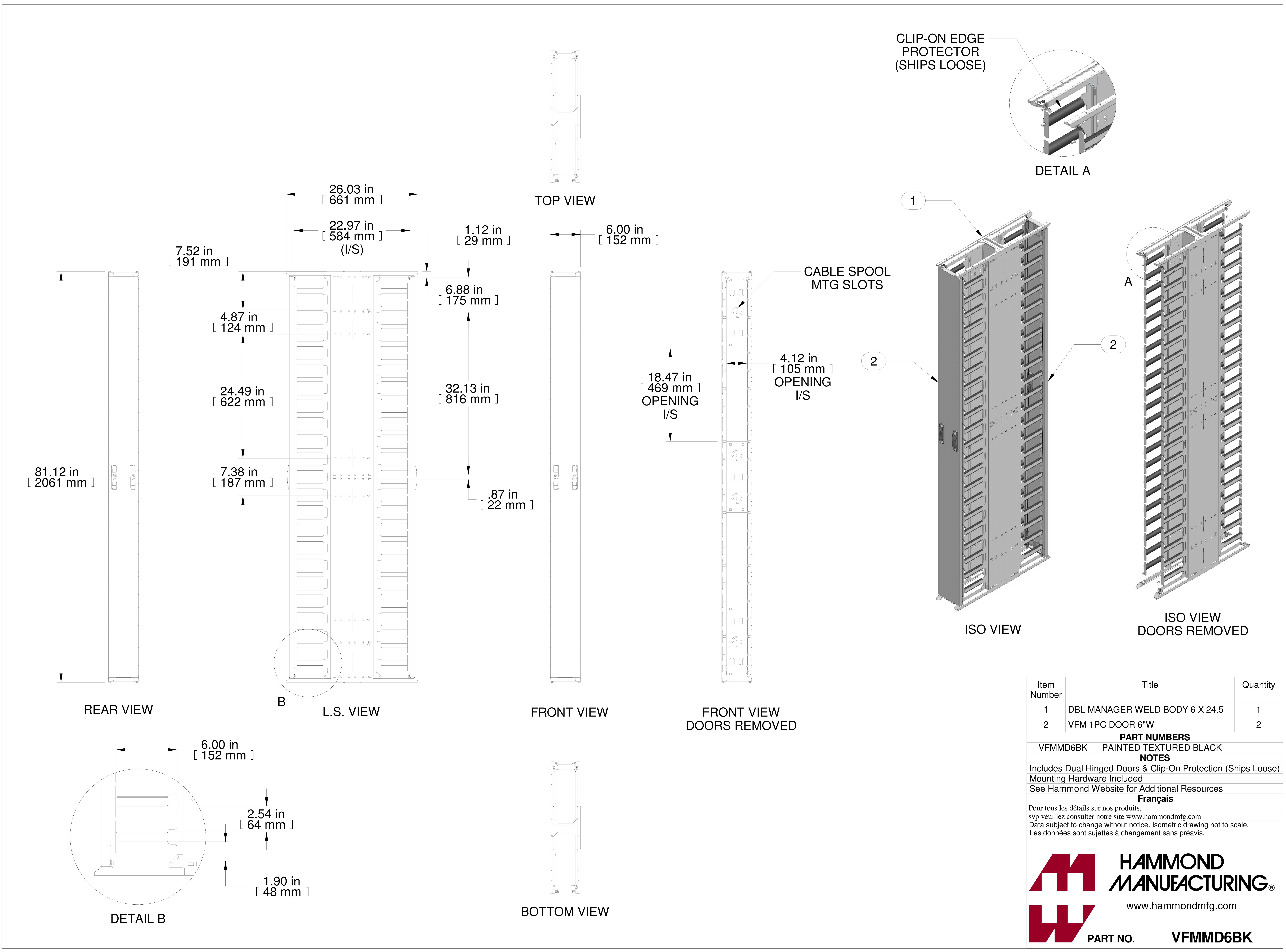
Part No.	RB-2P	RB-2PA19	RB-2PA23	DNRR (19")	DNRR (23")	DC4F	R44*	DRZ4*
All Sizes	DD 0D77	DD 0D44045DV	DD ODAGOAFDIA	D11007711014	DNDD0077UDWD	DO4D44	DOADTAA	DD7477
of VFM Compatible	RB-2P77	RB-2PA1945BK	RB-2PA2345BK	DNRR77HDW	DNRR2377HDWB	DC4R44	DC4RT44	DRZ477

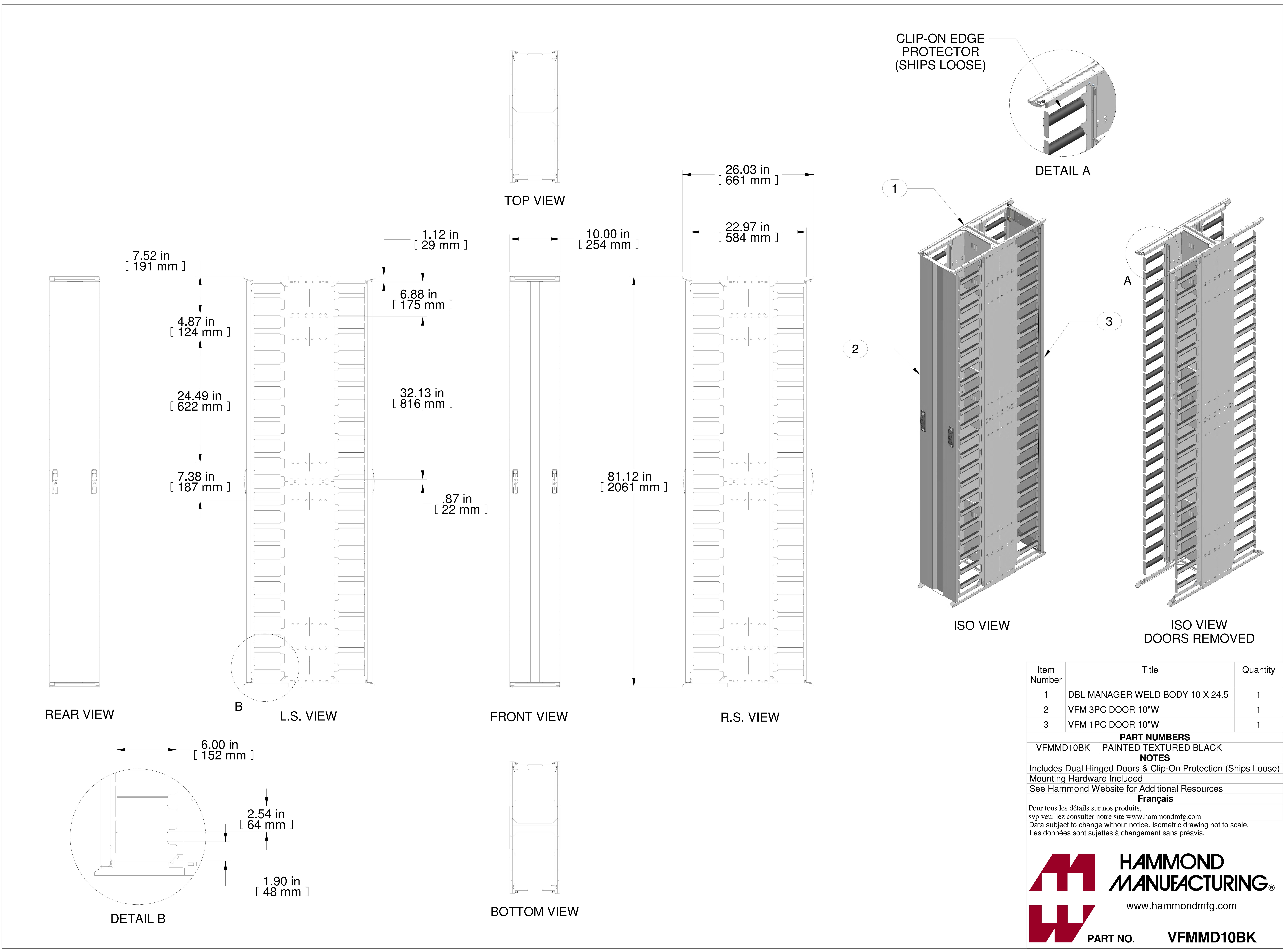
<sup>\*</sup> All options at this height are compatible.

Tags: double-sided manager, double sided

Data subject to change without notice

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Quality Products. Service Excellence.

# Horizontal Finger Cable Manager RB-HFMD Series



#### **Features**

- · Metal components constructed in 16-gauge steel.
- Fingers constructed in black plastic.
- Snap-on, hinged door.
- Includes cutouts at rear for cable pass-through.
- · EIA compliant.
- Metal components finished in textured RAL9005 black powder paint.
- Requires mounting hardware.
- TAA-compliant for GSA Schedule purchases.
- · RoHS Compliant.
- · Manufactured in North America.







For a doubled-sided manager, install two (2) managers mounted back-to-back. The rear opening provides a cable pass-thru.



# **Gallery**









#### **Accessories**

Mounting Hardware

· Hook and Loop Roll





	Ov	Overall Dinmensions		Usable Mounting Dimensions		
Part No.	Height	Width	Depth	Rack Units	Height	
RB-HFMD1	1.47	19.00	6.50	10	1.75	
RB-HFMD2	3.22	19.00	6.50	2U	3.50	
RB-HFMD3	5.22	19.00	6.50	3U	5.25	
RB-HFMD4	6.97	19.00	6.50	4U	7.00	

# **Estimated Cable Fill Capacities**

Rack		Recommended Ca	ble Fill (50% Fill Ratio)	Maximum Cable	Fill (100% Fill Ratio)
Units	Description	Cat 6	Cat 6a	Cat 6	Cat 6a
	Channel Opening	31	21	61	42
RB-HFMD1	Finger Opening	32	22	64	45
	Rear Pass Through	19	13	39	27
RB-HFMD2	Channel Opening	89	62	177	123
	Finger Opening	32	22	64	45
	Rear Pass Through	47	33	94	65
	Channel Opening	138	96	276	192
RB-HFMD3	Finger Opening	32	22	64	45
	Rear Pass Through	92	64	183	127
RB-HFMD4	Channel Opening	204	142	408	284
	Finger Opening	32	22	64	45
	Rear Pass Through	92	64	183	127

Data subject to change without notice

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#### APPENDIX F - PHSA COMMUNICATIONS STANDARD - HILTI FIRESTOP SYSTEM DETAILS

Category	System	Application	Product(s)		Detail #	System Note	Device Note
			CP 653 & CP 653 BA 2" Speed Sleeve CP 653 & CP 653 BA 4" Speed Sleeve CP 618 Firestop Putty				
Floors or Walls	C-AJ-3283	Cable bundle through concrete or masonry	FS-One Max	-40-	33.1	See detail	
Floors or Walls	C-AJ-3285	Cable bundle through concrete or masonry	CP 653 & CP 653 BA 2" Speed Sleeve CP 653 & CP 653 BA 4" Speed Sleeve CP 606 Sealant CFS-S SIL GG CFS-S SIL SL (floors only) FS-One Max		New (33.1)	See detail	
	W-L-3334 (long version of Speed	Cable bundle through gypsum wall assembly	CP 653 & CP 653 BA 2" Speed Sleeve CP 653 & CP 653 BA 4" Speed Sleeve CFS-SL GA L 2" & 4" Speed Sleeves (*shall only be used for wall thickness of 8" or greater) CP 606 Sealant FS-One Max Intumescent Sealant	NOTIONALA MOTIONALA		See detail	
			CFS-SL GP 16" & 24" Firestop Gangplate CFS-SL GP CAP Firestop Gangplate CAP CFS-SL RK 4" Firestop Sleeve CFS-SL SK 4" Firestop Retrofit Sleeve CP 653 4" Speed Sleeve CFS-PL Firestop Plug	METICALA METICALA		See detail	
Concrete or Masonry Walls	W-J-3189	Multiple cable bundles	CP 653 & CP 653 BA 2" Speed Sleeve CP 653 & CP 653 BA 4" Speed Sleeve CFS-SL GA L 2" & 4" Speed Sleeves (*shall only be used for wall thickness of 8" or greater) CP 606 Sealant FS-One Max Intumescent Sealant	COMPONATION B  COMPONATION B  COMPONATION B	New	INSTALL PER HILTI SYSTEM DRAWING W-J-3189	
Concrete or Masonry Walls	W-J-3200	Multiple cable bundles	CFS-SL GP 16" & 24" Firestop Gangplate CFS-SL GP CAP Firestop Gangplate CAP CFS-SL RK 4" Firestop Sleeve CFS-SL SK 4" Firestop Retrofit Sleeve CFS-PL Firestop Plug CP 653 4" Speed Sleeve	SECTION AS SECTION AS	New	INSTALL PER HILTI SYSTEM DRAWING W-J-3200	
	C-AJ-3345 (Speed Sleeves in Gangplate through late opening in concrete wall, using Hilti	Multiple cable bundles (0 to 100% fill) IN LARGE REC	CP 619T Firestop Putty Roll FS-One Max Intumescent Sealant CFS-COS Firestop Composite Sheet CFS-SL-GP 24" Firestop Gangplate		New	INSTALL PER HILTI SYSTEM DRAWING C-AJ-3345	HILTI FIRESTOP DEVICE CP 653 BA 4" SPEED SLEEVE CFS-COS FIRESTOP COMPOSITE SHEET CFS-SL-GP 24" FIRESTOP GANGPLATE WITH HILTI FIRESTOP SELANT OR PUTTY INSTALLED PER SYSTEM

#### APPENDIX F - PHSA COMMUNICATIONS STANDARD - HILTI FIRESTOP SYSTEM DETAILS

Concrete Floors	F-A-3060	Cable bundle through CIP device with Speed Sleeve	CP 680-M/P 4" / CP 680-M/PX 2" CP 653 4" & 2" Speed Sleeve	Section A	33.3	See detail	
Gypsum Walls	W-L-3384 ("ganged" Speed Sleeves through gypsum wall)	Multiple cable bundles (0 to 100% fill) - "ganged"	CP 653 & CP 653 BA 2" Speed Sleeve CP 653 & CP 653 BA 4" Speed Sleeve CFS-SL GA L 2" & 4" Speed Sleeves (*shall only be used for wall thickness of 8" or greater) CP 606 Sealant FS-One Max Intumescent Sealant	COMPARADOR	New	SYSTEM DRAWING	HILTI FIRESTOP DEVICE CP 653 OR CP 653 BA 4" SPEED SLEEVE OR CFS-SL GA 4" SPEED SLEEVES ("FOR 8" OR GREATER WALL THICKNESS ONLY)
Concrete Floors	F-A-3007	Cable bundle through CIP device	CP 680-M/P 4" / CP 690-M/PX 3" / CP 680- M/PX 2" CP 618 Firestop Putty Stick	SECTION A.A.	33.4	See detail	

#### APPENDIX G - IDENTIFICATION FOR BIOMEDICAL PATCHED CABLES

#### PART 1 GENERAL

#### 1.1 OVERVIEW

.1 Before proceeding with the labelling, the Division 27 Contractor will supply and confirm samples of methods of labelling and materials used as detailed in these specifications.

#### PART 2 PRODUCTS

#### 2.1 LABELS

- .1 Labels on patch panel system:
  - .1 Labels are supplied in the form of tape:

White Patch Cord

- .2 Labels on GigaBix system:
  - .1 Labels are supplied in the form of tape:

White Jumper Wire and Pigtails

#### PART 3 EXECUTION

#### 3.1 INSTALLATION

- .1 All patch cords and jumper wires shall be labelled with an instruction not to remove them, the application name, purpose and the installation date. The information will be displayed in the form of a label supplied and installed by the Division 27 Contractor. The exact placement of the label will be on both ends of the patch cord, pigtail and jumper wire.
- .2 Unless specified otherwise, labels will be machine-printed on tape. Brother "P-touch" electronic labelling system, or equal approved shall be used.
- .3 The Division 27 Contractor will label the patch cord, pigtail and jumper wire with 9 mm high black on white mechanical label for the IDs.
- .4 Biomedical Label Standard for Patch Cord, Pigtail and Jumper Wire
  - .1 Each patch cable and wire will be identified on both ends with a label. For example: Patch Cord, Pigtail and Jumper Wire Label

i.e. DON'T REMOVE, BMDI, PATIENT MONITOR, 2019 2/2

DON'T REMOVE Represents instruction not to remove the patched cable.

BMDI Represents Biomedical Device Integration (application

name).

PATIENT MONITOR Represents the purpose of the application.

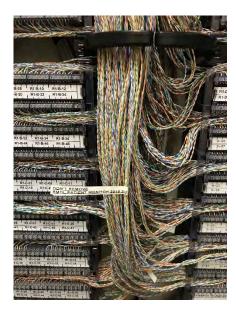
2019 2/2 Represents the date of installation i.e. year, month and

day.

.2 Pictured below is an example of a biomedical label ID (9 mm) on a patch cable:



.3 Pictured below is an example of a biomedical label ID (9 mm) on a jumper wire:



**END OF SECTION** 

Project No.

#### APPENDIX G.2 - IDENTIFICATION FOR COPPER AND FIBER PATCHED CABLES

#### PART 1 GENERAL

#### 1.1 OVERVIEW

- .1 Before proceeding with the labelling, the Division 27 Contractor will supply and confirm samples of methods of labelling and materials used as detailed in these specifications.
- .2 The PHSA NC Representative will provide the information relating to the type, length and quantity of the patch cords.

#### PART 2 PRODUCTS

#### 2.1 LABELS

- .1 Labels on Copper and Fiber patch cords originating from Network Core Switch:
  - .1 Labels are supplied in the form of tape:

White Patch Cord

#### PART 3 EXECUTION

#### 3.1 INSTALLATION

- .1 All Copper and Fiber patch cords originating from Network Core Switch shall be labelled with a unique alpha-numeric label. The information will be displayed in the form of a label supplied and labelled by the Division 27 Contractor, but patched by the PHSA NC Representative. The exact placement of the label will be on both ends of the patch cord.
- .2 Unless specified otherwise, labels will be machine-printed on tape. Brother "P-touch" electronic labelling system, or equal approved shall be used.
- .3 The Division 27 Contractor will label the patch cord with 9 mm high black on white mechanical label for the IDs.
- .4 When printed, Line 1 and Line 2 will be on ONE side of the label so when it is wrapped around the cord, the whole content is visible on ONE side.
- .5 Network Label Standard for Copper Patch Cord from Primary Core to Secondary Core in Data Centre application
  - .1 Each copper patch cable shall be identified on both ends with a unique alphanumeric label.

Copper Patch Cord Label Example:

Line one: Source device/port PCC-01A-R1.8-SW1-Te5/0/42 Line two: Destination device/port PCC-01A-R2.1-SW1-Gi1/0/2

Line one: Source device/port

PHSA

Project No.

Communications
Province Wide

#### APPENDIX G.2 - IDENTIFICATION FOR COPPER AND FIBER PATCHED CABLES

Page 2 of 3

PCC Represents building code

01A Represents from 1st Floor Communications Room A

R1.8 Represents Row 1, Rack 8 SW1 Represents Core Switch Stack 1

Te5/0/42 Represents Ten-Gigabit Ethernet, Unit 5, Module Slot 0,

Port 42

Line two: Destination device/port

PCC Represents building code

01A Represents to 1st Floor Communications Room A

R2.1 Represents Row 2, Rack 1 SW1 Represents Switch Stack 1

Gi1/0/2 Represents Gigabit Ethernet, Unit 1, Module Slot 0, Port 2

.2 Pictured below is an example of a label ID (9 mm) on a Copper patch cable:

TBD

- .6 Network Label Standard for Fiber Patch Cord
  - .1 Each fiber patch cable shall be identified on both ends with a unique alpha-numeric label.
    - .1 Core MER, Building 1 to TR, Building 2

Fiber Patch Cord Label Example:

Line one: Source device/port NCC-01A-R2-SW1-Te5/0/42 Line two: Destination device/port CCC-02B-R1-SW1-Gi1/0/2

Line one: Source device/port

NCC Represents building code

01A Represents from 1st Floor Communications Room A

R2 Represents Rack 2 SW1 Represents Switch Stack 1

Te5/0/42 Represents Ten-Gigabit Ethernet, Unit 5, Module Slot 0,

Port 42

Line two: Destination device/port

CCC Represents building code

02B Represents to 2<sup>nd</sup> Floor Communications Room B

R1 Represents Rack 1
SW1 Represents Switch Stack 1

Gi1/0/2 Represents Gigabit Ethernet, Unit 1, Module Slot 0, Port 2

Pictured below is an example of a label ID (9 mm) on a Copper patch cable:

TBD

#### .2 MER, Building 2 (Intermediate Hop would only be passive)

Fiber Patch Cord Label Example:

Line one: Source device/port NCC-01A-R2-SW1-Te5/0/42 Line two: Destination device/port CCC-02B-R1-SW1-Gi1/0/2

Line one: Source device/port

NCC Represents building code

01A Represents from 1st Floor Communications Room A

**PHSA** 

Communications
Province Wide

APPENDIX G.2 - IDENTIFICATION FOR COPPER AND FIBER PATCHED CABLES

Project No. Page 3 of 3

R2 Represents Rack 2 SW1 Represents Switch Stack 1

Te5/0/42 Represents Ten-Gigabit Ethernet, Unit 5, Module Slot 0,

Port 42

Line two: Destination device/port

CCC Represents building code

02B Represents to 2<sup>nd</sup> Floor Communications Room B

R1 Represents Rack 1 SW1 Represents Switch Stack 1

Gi1/0/2 Represents Gigabit Ethernet, Unit 1, Module Slot 0, Port 2

Pictured below is an example of a label ID (9 mm) on a Copper patch cable:

TBD

#### .3 TR, Building 2

Fiber Patch Cord Label Example:

Line one: Source device/port NCC-01A-R2-SW1-Te5/0/42 Line two: Destination device/port CCC-02B-R1-SW1- Gi1/0/2

Line one: Source device/port

NCC Represents building code

01A Represents from 1st Floor Communications Room A

R2 Represents Rack 2 SW1 Represents Switch Stack 1

Te5/0/42 Represents Ten-Gigabit Ethernet, Unit 5, Module Slot 0,

Port 42

Line two: Destination device/port

CCC Represents building code

02B Represents to 2<sup>nd</sup> Floor Communications Room B

R1 Represents Rack 1
SW1 Represents Switch Stack 1

Gi1/0/2 Represents Gigabit Ethernet, Unit 1, Module Slot 0, Port 2

Pictured below is an example of a label ID (9 mm) on a Fiber patch cable:

TBD

#### **END OF SECTION**

# APPENDIX G.3 - IDENTIFICATION FOR WIRELESS ACCESS POINTS AND NETWORK SWITCHES

ect No. Page 1 of 2

#### APPENDIX G.3 - IDENTIFICATION FOR WIRELESS ACCESS POINTS AND NETWORK SWITCHES

#### PART 1 GENERAL

#### 1.1 OVERVIEW

.1 Before proceeding with the labelling, the PHSA NE representative will supply and confirm samples of methods of labelling and materials used as detailed in these specifications.

#### PART 2 PRODUCTS

#### 2.1 LABELS

- .2 Labels on interior wireless access points and network switches:
  - .1 Labels are supplied in the form of tape:

White Wireless Access Point, Network Switch

- .3 Labels on exterior wireless access points and in wet and dirty environments:
  - .2 Labels are supplied in the form of Lamacoid:

White Wireless Access Point

#### PART 3 EXECUTION

#### 3.1 INSTALLATION

- .1 All wireless access points and network switches will be assigned an unique alpha-numeric ID number. The number will be displayed in the form of a label supplied and installed by PHSA NE representative. For wireless access points, the exact placement will be on the face of the device. For switches, the exact placement will be highly visible on either the left or the right side of the switch.
- .2 Unless specified otherwise, labels will be machine-printed on tape. Brother "P-touch" electronic labelling system, or equal approved shall be used. When access points are located outside or in wet, dirty or humid environments such as a parkade, a suitable alternate labelling product (ex. Lamacoid) will be employed.
  - .3 The PHSA NE Representative will label the access point with with 24 mm high black on white mechanical label for the wireless device ID, and 12 mm high black on white mechanical label for the cable ID. Extra strength adhesive P-touch TZS laminated tapes shall be used. Labelling colour and lettering height may be adjusted in accordance with the AP elevation and installation environment so that the label does not fade over time and is visible from the ground or floor.
- .4 Wireless Access Point Naming Standard
  - .1 Each wireless access points will be identified with an unique number on the face of the device. For example:

Wireless Access Point Label

i.e. RCT-01A-AP01

PHSA
Communications
Province Wide
Project No

# APPENDIX G.3 - IDENTIFICATION FOR WIRELESS ACCESS POINTS

**AND NETWORK SWITCHES** 

Page 2 of 2

RCT	Represents combined site/building code in a campus setting environment, or building code only for single building that is not part of
	a campus.
01A	Represents MER 1st floor Communications room A.
AP01	Represents Wireless Access Point #1. The AP ID range will be confined
	to the communications zone boundary of a particular communications
	room so that when adding an AP to a particular communications zone
	any time after the initial deployment is complete, the ID of that AP will
	be next one in sequence for that zone.

- .2 In addition to the above, additional labels for the cable IDs will be placed on the face of the wireless access point. Refer to PHSA Communications Infrastructure Standards and Specifications (Section 27 05 53) for further details.
- .3 Pictured below is an example of a wireless device ID (24 mm) and 2 x cable IDs (12 mm) labelled at the top:



- .4 If the wireless access points is housed within an enclosure, the enclosure will also be labelled with the wireless access point and cable IDs.
- .5 Network Switch Naming Standard
  - .1 Each switch will be labelled with a unique number. For example:

**Network Switch Label** 

i.e. RCT-01A-R2-SW1-1

RCT Represents combined site/building code in a campus setting

environment, or building code only for single building that is not part of

a campus.

01A Represents MER 1st floor Communications room A.

R2 Represents Rack #2.

SW1-1 Represents Switch Stack #1, Switch #1.

**END OF SECTION** 

#### APPENDIX H - PHSA POWER STANDARDS - UPS/ePDU DRAWINGS

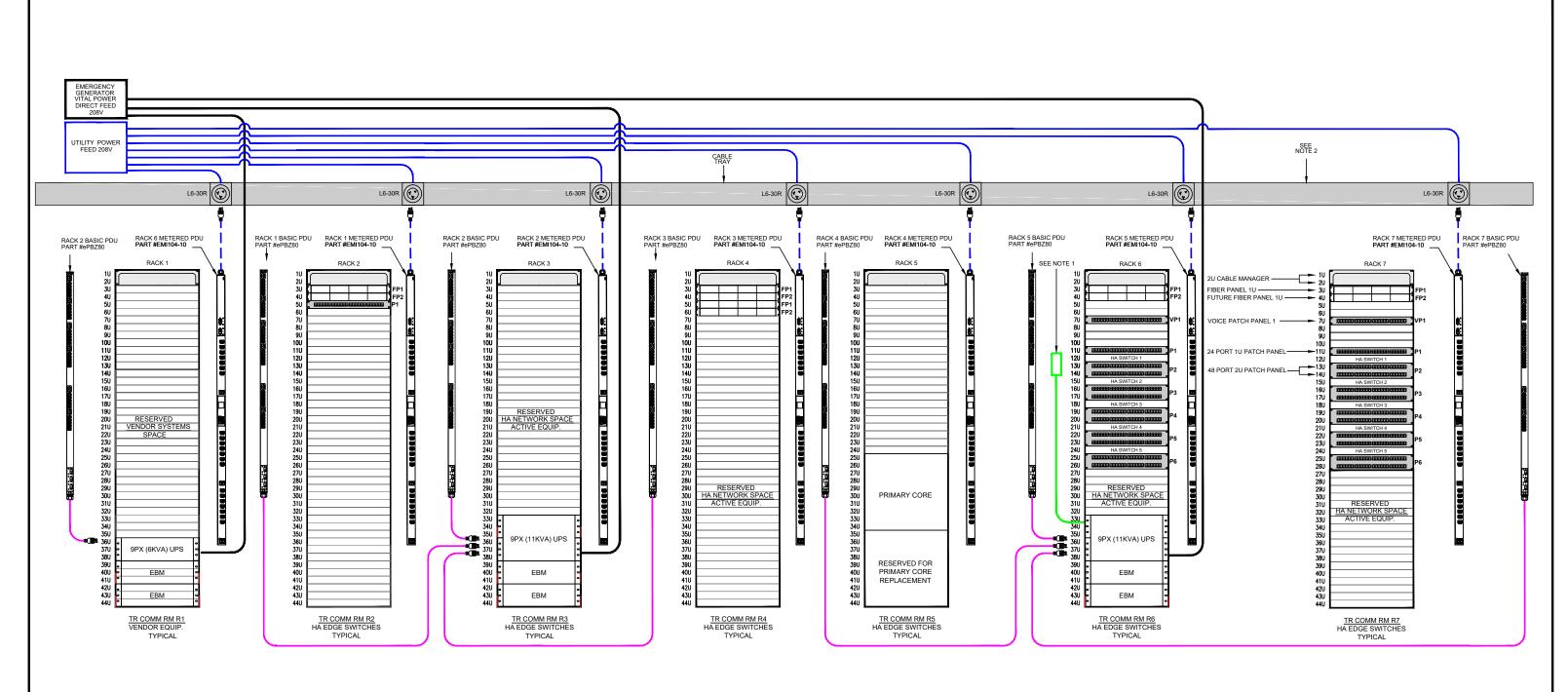
#### TABLE 1 DRAWING INDEX

Drawing No.	Drawing Title	Rev.
APPX-H-001-H-MER-7R-11KVA	Acute MER 7-Racks 11KVA	1
APPX-H-002-H-MER-TR-4R-11KVA	Acute MER/TR 4-Racks 11KVA	1
APPX-H-003-H-MER-TR-3R-8KVA	Acute MER/TR 3-Racks 8KVA	1
APPX-H-004-H-TR-2R-6KVA	Acute TR 2-Racks 6KVA	1
APPX-H-005-H-TR-1R-6KVA	Acute TR 1-Rack 6KVA	1
APPX-H-006-C-MER-4R-8KVA	Community MER 4-Racks 8KVA	1
APPX-H-007-C-MER-TR-3R-8KVA	Community MER/TR 3-Racks 8KVA	1
APPX-H-008-C-TR-2R-6KVA	Community TR 2-Racks 6KVA	1
APPX-H-009-C-TR-1R-3KVA	Community TR 1-Rack 3KVA	1
APPX-H-010-ATS	ATS Connections	1

#### Power Assessment

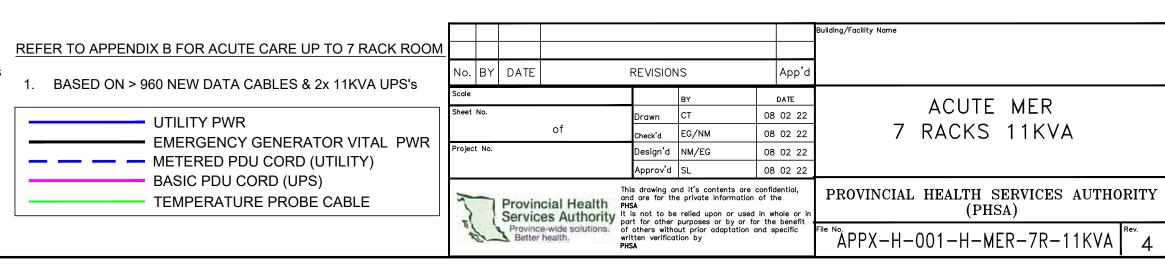
During the process of assessing the Communication Room requirements for both Generator and UPS distribution loads/demand, engage Facilities Maintenance & Operations early in the process to ensure there is sufficient capacity in the distribution system, and inform them of the increased load demand being planned.

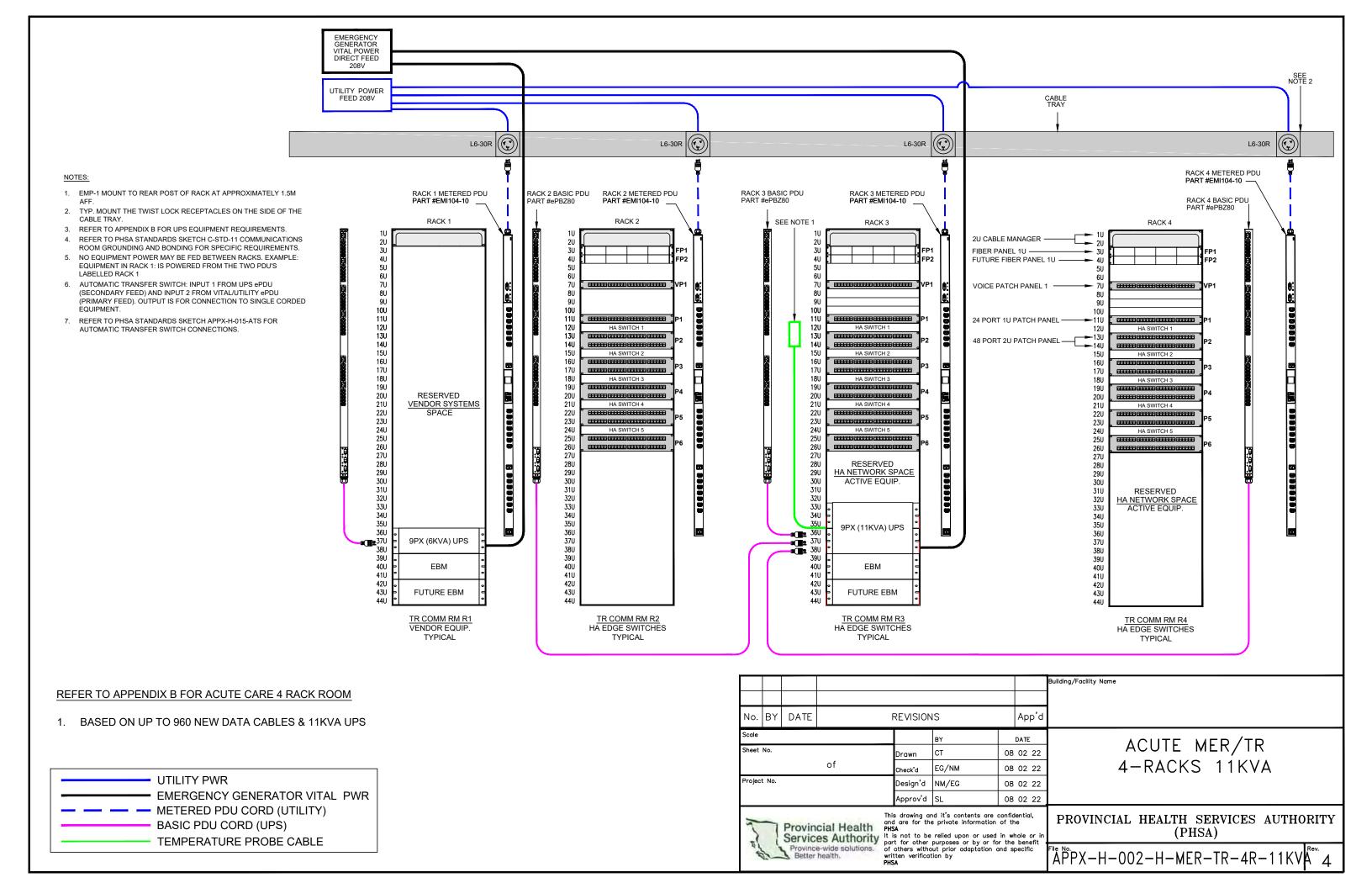
PHSA January 31st, 2022

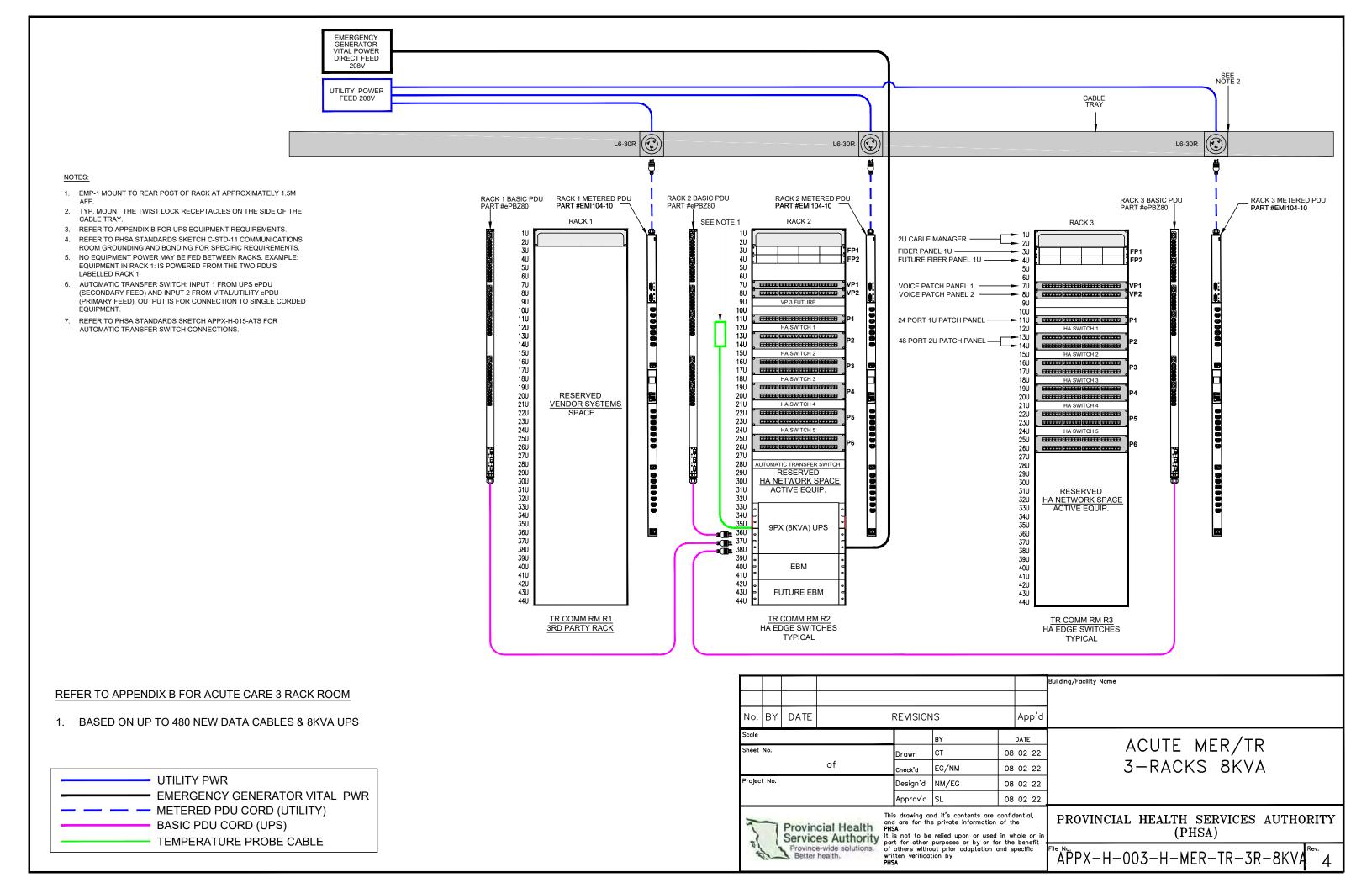


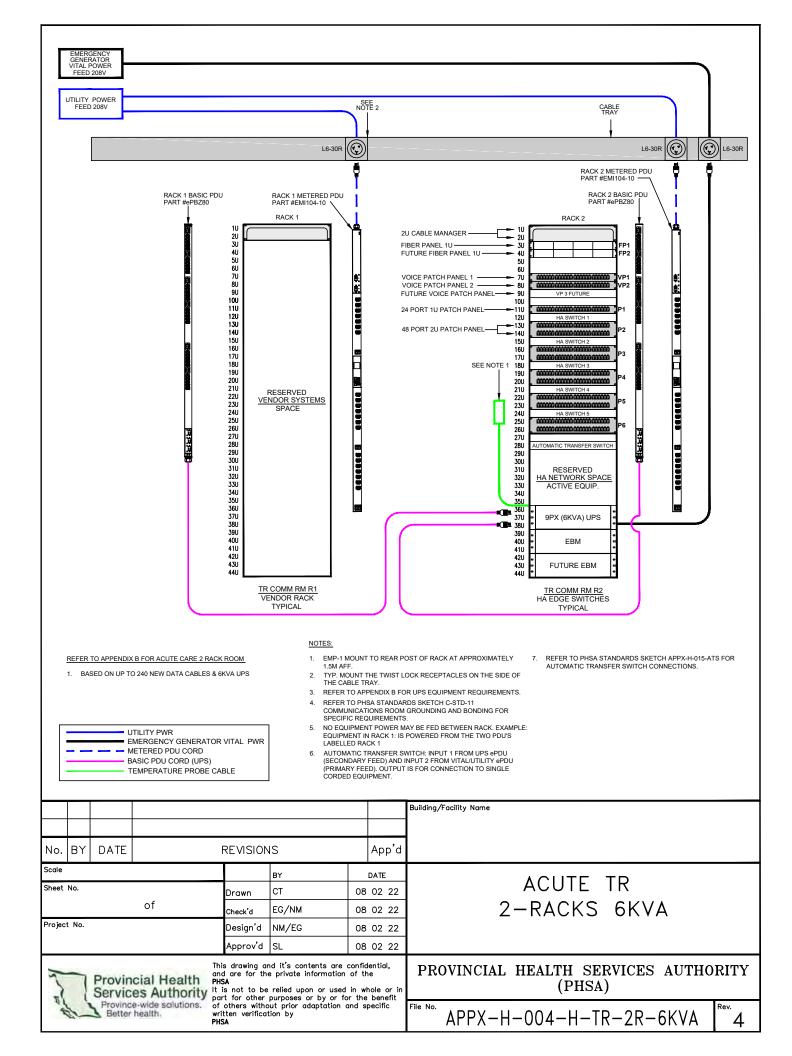
#### NOTES:

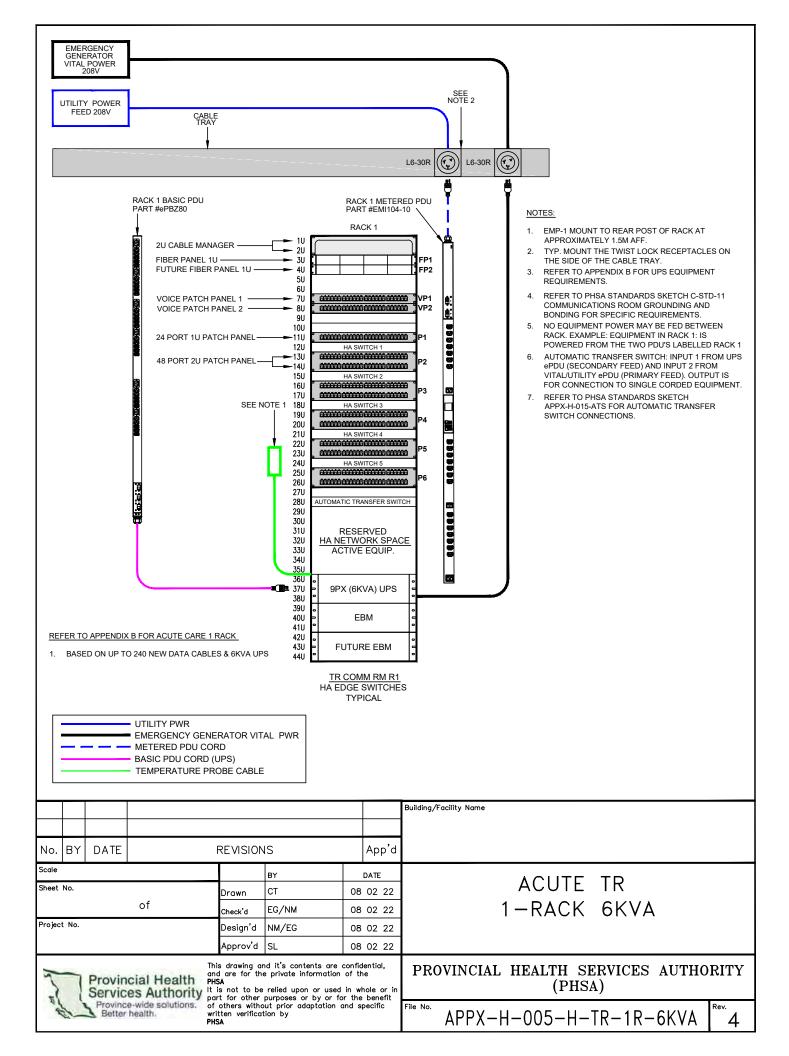
- 1. EMP-1 MOUNT TO REAR POST OF RACK AT APPROXIMATELY 1.5M AFF.
- 2. TYP. MOUNT THE TWIST LOCK RECEPTACLES ON THE SIDE OF THE CABLE TRAY.
- 3. REFER TO APPENDIX B FOR UPS EQUIPMENT REQUIREMENTS.
- 4. REFER TO PHSA STANDARDS SKETCH C-STD-11 COMMUNICATIONS ROOM GROUNDING AND BONDING FOR SPECIFIC REQUIREMENTS.
- 5. NO EQUIPMENT POWER MAY BE FED BETWEEN RACKS. EXAMPLE: EQUIPMENT IN RACK 1: IS POWERED FROM THE TWO PDU'S LABELLED RACK 1
- 6. AUTOMATIC TRANSFER SWITCH: INPUT 1 FROM UPS ePDU (SECONDARY FEED) AND INPUT 2 FROM VITAL/UTILITY ePDU (PRIMARY FEED). OUTPUT IS FOR CONNECTION TO SINGLE CORDED EQUIPMENT.
- REFER TO PHSA STANDARDS SKETCH APPX-H-015-ATS FOR AUTOMATIC TRANSFER SWITCH CONNECTIONS.

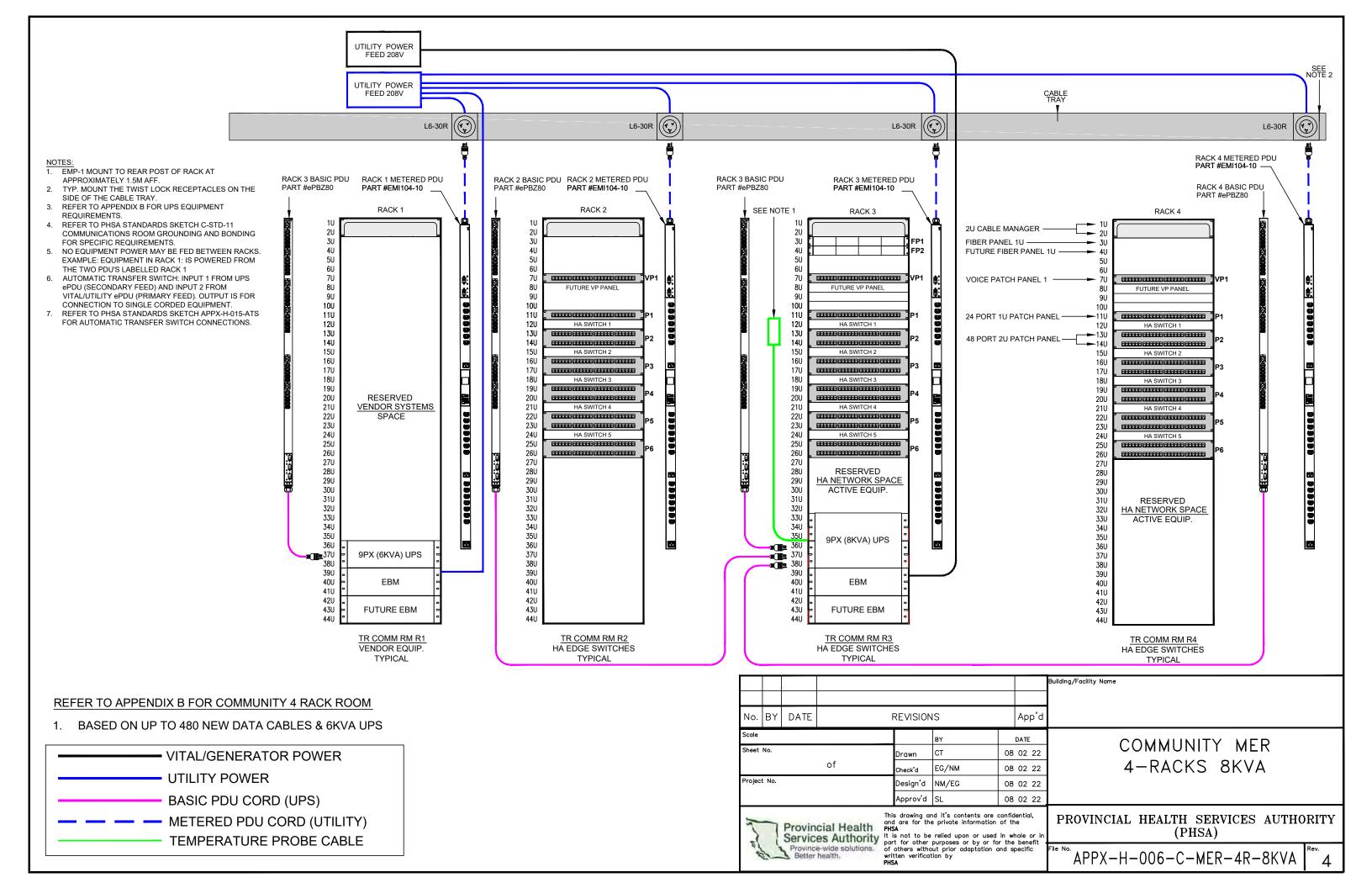


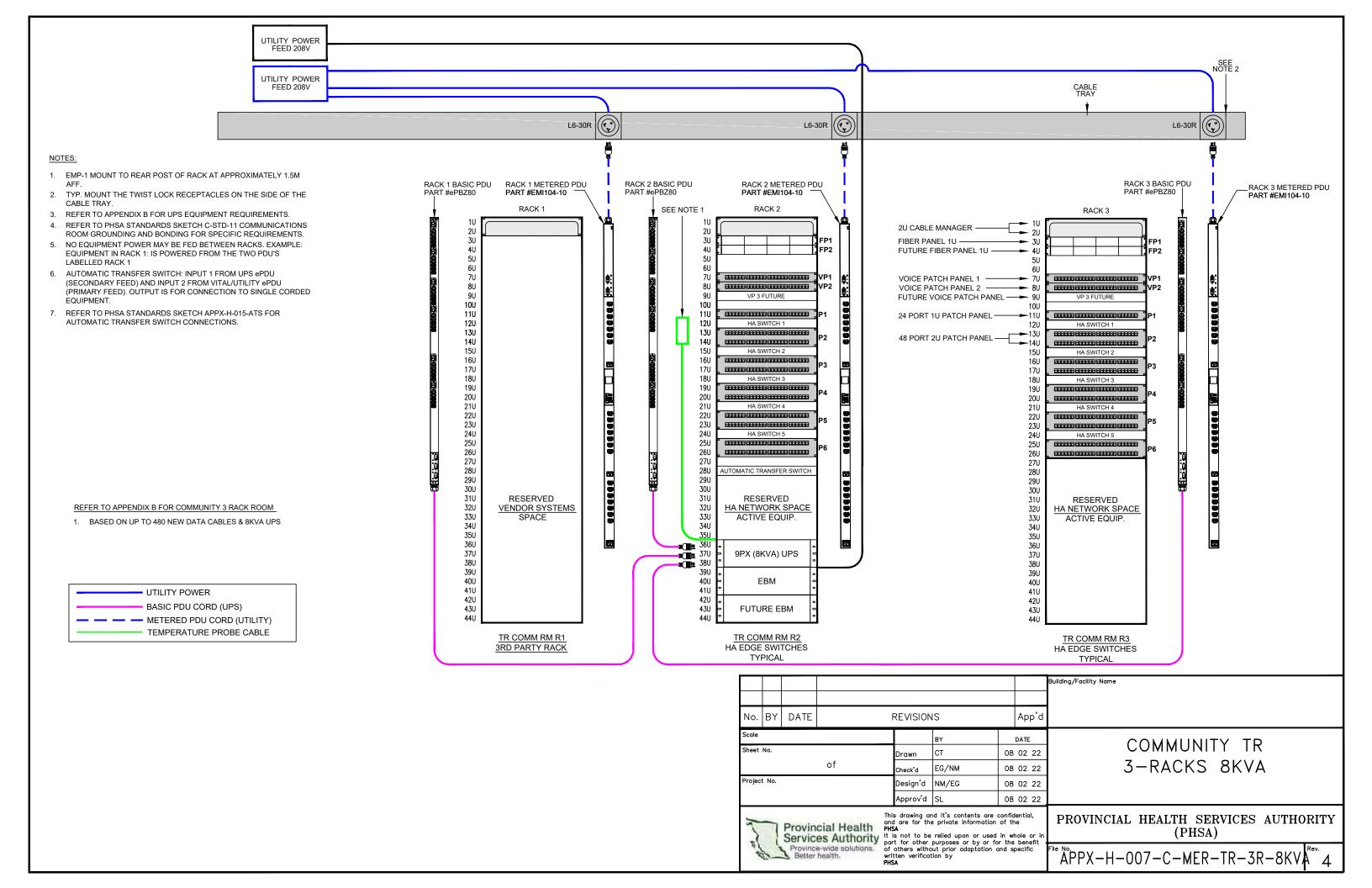


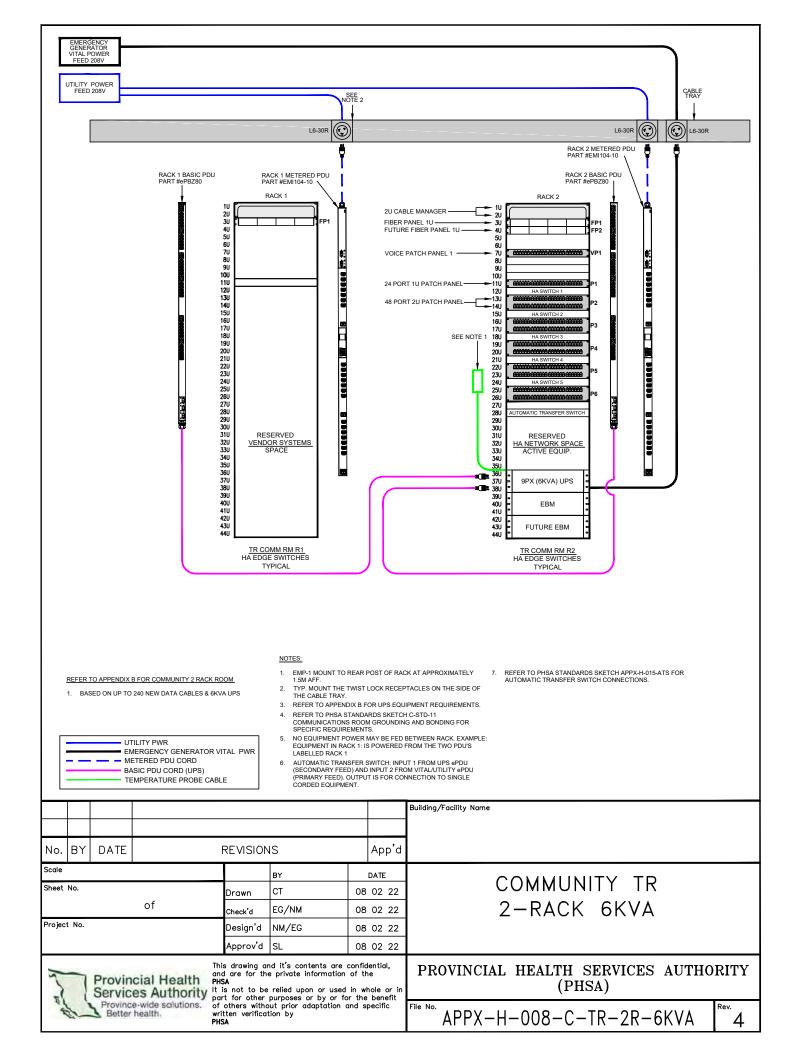


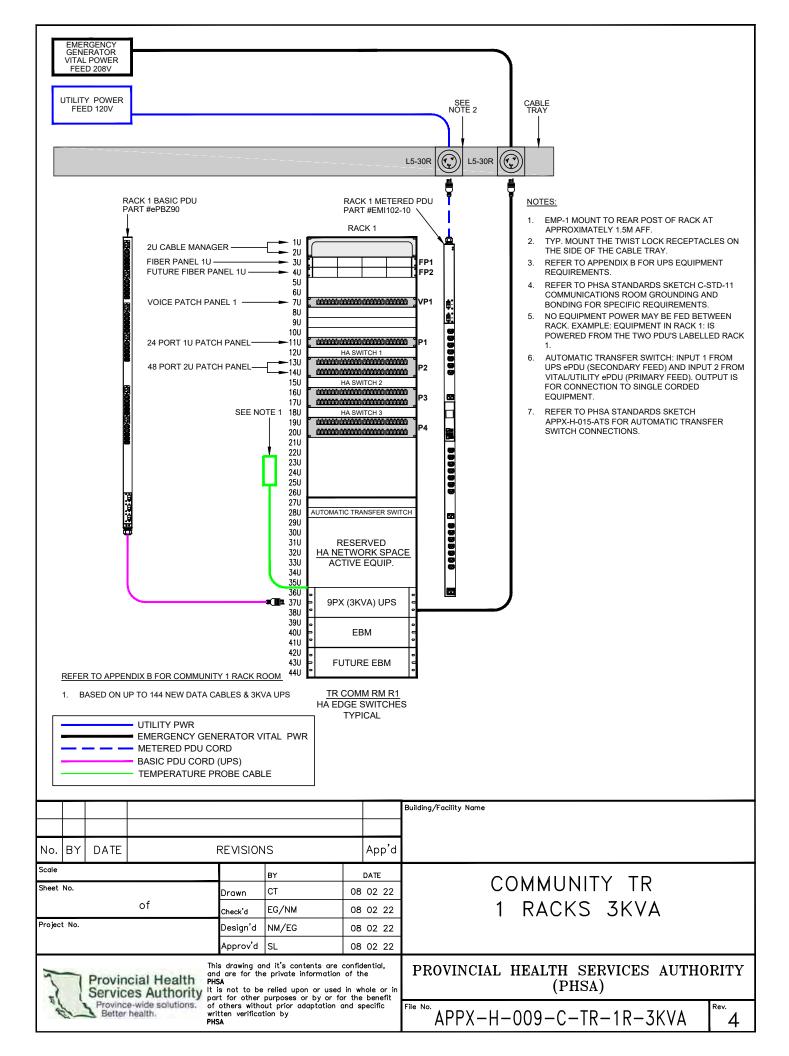


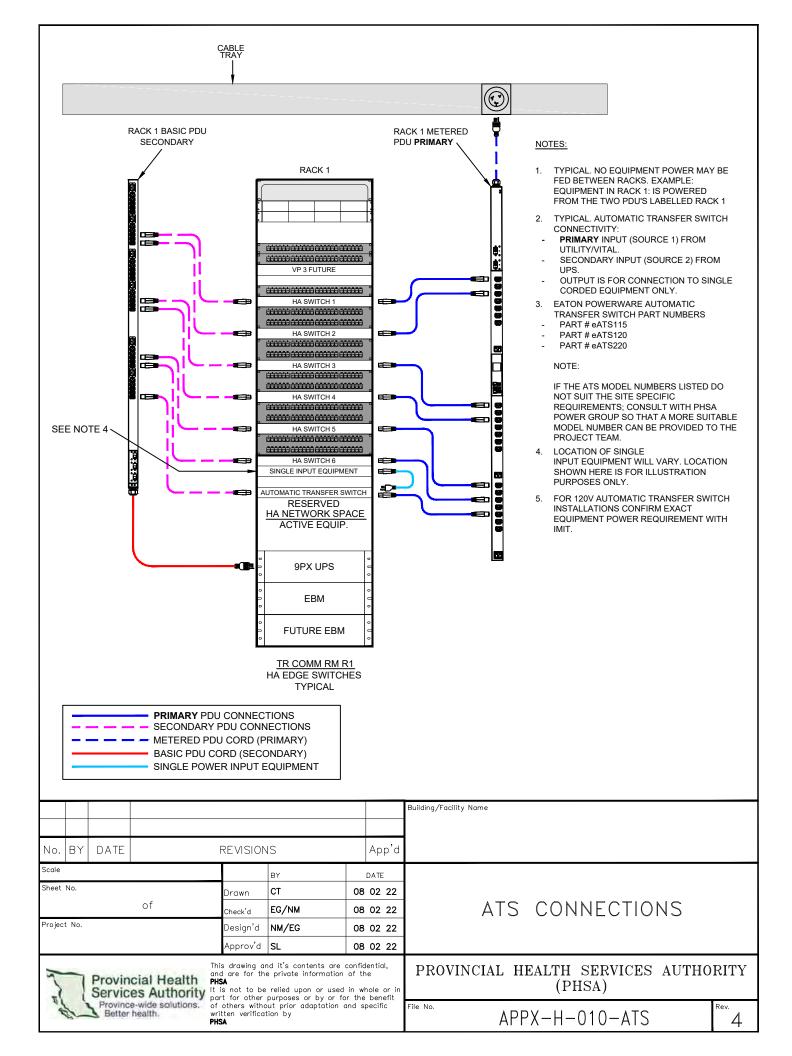












#### APPENDIX I - CATEGORY 6A DATA CABLING PATCHING LAYOUT

#### PART 1 GENERAL

#### 1.1 DATA CABLING PATCHING METHODOLOGY

- .1 The data cabling patching methodology described below addresses the problems with patch cord management today the accumulation of excessive slack in various standard length manufactured cords and the entangling effect that turns them into "spaghetti" over time. They suffer from the additional problems of unpredictable, inconsistent, or degraded performance.
- .2 The prescribed patching method covers patching of wireless access point cabling and other data cabling utilizing 310 mm standard patch cable to patch between the patch panel jacks and the switchports.
- .3 Div. 27 contractor will terminate the wireless access point outlets c/w dual Cat6A horizontal cables as per description below for wireless data cabling.
- .4 Each wireless ceiling outlet is terminated with two horizontal cables, Primary (P) cable and Secondary (S) cables. This is for the purpose of illustration only. Label cables as per PHSA standards.
- .5 Distribute the wireless cables between Patch panels as shown in the diagrams and elevation details.

#### PART 2 PRODUCTS

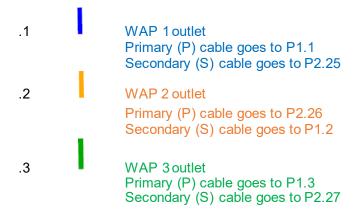
#### 2.1 LABELS

- .1 Only 310mm (12") standard patch cable (based Grey) shall be used to patch between the patch panel jacks and the switch ports.
- .2 Category 6A patch cords must be 28AWG small diameter type.

Page 2 of 4

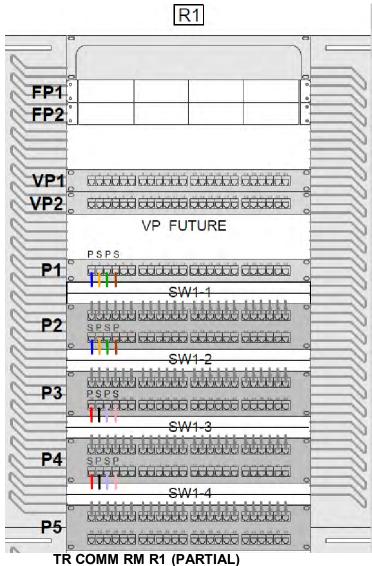
#### PART 3 EXECUTION

#### 3.1 INSTALLATION



- .4 **P1:**Terminate wireless cabling on P1, Ports 1 to 24, and patch into SW1-1, Top row
- .5 **P2:**Terminate wireless cabling on P2, Ports 25 to 48, and patch into SW1-2, Top row
  Terminate non wireless cabling on P2, Ports 1 to 24, and patch into SW1-1, Bottom row
- .6 P3:
  Terminate wireless cabling on P3, Ports 25 to 48, and patch into SW1-3, Top row
  Terminate non wireless cabling on P3, Ports 1 to 24, and patch into SW1-2, Bottom row
- .7 P4:
  Terminate wireless cabling on P4, Ports 25 to 48, and patch into SW1-4, Top row
  Terminate non wireless cabling on P4, Ports 1 to 24, and patch into SW1-3, Bottom row
- .8 **P5:**Terminate wireless cabling on P5, Ports 25 to 48, and patch into SW1-5, Top row
  Terminate non wireless cabling on P5, Ports 1 to 24, and patch into SW1-4, Bottom row
- .9 **Note:**Terminate the Primary and the Secondary wireless cabling from the same WAP outlet in the same Rack.

Page 3 of 4

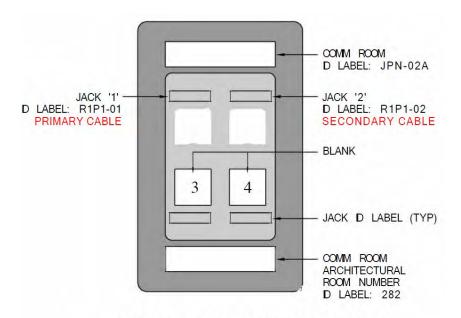


TR COMM RM R1 (PARTIAL) HA EDGE SWITCHES TYPICAL

#### **LEGEND:**

WAP 1 OUTLET PRIMARY (P) CABLE AND SECONDARY (S) CABLE
WAP 2 OUTLET PRIMARY (P) CABLE AND SECONDARY (S) CABLE
WAP 3 OUTLET PRIMARY (P) CABLE AND SECONDARY (S) CABLE
NON WIRELESSDATA CABLES FROMSAMEOUTLETTERMINATED SEQUENTIALLY

Page 4 of 4



EXAMPLE: 4-PORT CEILING OUTLET PLATE

**END OF SECTION** 

# APPENDIX J (EXT'G FHA CAT6 SITES)

# PHSA WIFI & SWITCH LAYOUT STANDARDIZATION

Mar 15, 2021

# WIFI STANDARDIZED DEPLOYMENT PROCESS

Authors: Pierre Lluncor & Mick Bhullar

WiFi Standardized deployment process for use in any WiFi deployment for FHA



# **TABLE OF CONTENTS**

WiFi Standardized Deployment Process	1
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Process for deployment	3
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GigaBix Field implementation example:	8
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Exceptions to the rule:	14
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# **DEPLOYMENT ENVIRONMENT**

At this time this deployment will occur only in existing CAT6 GigaBix cabling environments.

# PROCESS FOR DEPLOYMENT

## **Cat6A Front Loading Patch panel installation details**

- Cat6A front loading Patch Panels will by default be installed as noted below and only Cat6A cabling shall be installed.
  - o (no mixing of any other category cable is permitted)
- Depending on cable count required a 1x 1RU 24 Port or 1x 2RU 48
   Port front loading Patch panel (Fully populated) is to be installed and labeled APP1.
- Space permitting, the front loading patch panel is to be installed at the top of the rack
- Any further additional front loading Patch panels required are to be installed as 1x 2RU 48 Port front loading Patch panels (Fully populated) and labeled APP2.
- The additional the front loading patch panels are recommended to be installed below APP1, however if there is not sufficient space for both then please consult with PHSA NE representative for best location to install.

## WiFi Deployment

- Each WAP is to have dual Cat6A patch cables installed
- If more WAPs are needed to be deployed they are to be installed on APP2 (1x 2RU 48 Port Front loading Patch Panel)
- The WiFi team or the PHSA NE is required to take the lead on the job.
- The Cable Technician shall follow through with the cross-connections accordingly

# WiFi Deployment Example:

- o WAP 1
  - Primary cable: Terminated on APP1 port 1
  - Secondary cable: Terminated on APP1 port 2
- o WAP 2
  - Primary cable: Terminated on APP1 port 3
  - Secondary cable: Terminated on APP1 port 4
- o Continue on with deployment
- Small diameter Cat6A patch cords will be used to patch the WAP to the switch in an orderly fashion.

# **SWITCH DEPLOYMENT:**

# **Single Switch Deployment:**

- The switch will have the first twelve (12) ports to be designated for use for Wireless deployments and used on an as-needed-basis.
- Ports will be freed up, starting from port 1 progressing to port 12 on the switch, based on the number of WAPs needed to be deployed.
- Require GigaBix field to be updated with the use of special service guard for the pigtails that were unplugged to show that the jack can no longer be used.
- Projects are required to execute the cross-connect moves. This activity shall not be left to PHSA NE field Technicians to complete.
- Requires Projects to plan ahead and monitor/fix the cross-connect moves the next morning for any port activation issues
- Requirement to maintain 20% or more port availability on the switch.
   If this cannot be maintained a new additional switch of the current-in-production model must be ordered as well as one bundle of 48 Cat6 pigtails.

## **Method of deployment:**

### Switch stack 1 → Members in stack: 1

- Active connections before WiFi: 24
- New WAPs needed for activation: 4
- Total ports to be used on switch: 28
- Port availability: 20 ports or 42%
- Require first 4 ports on switch unit 1 to be used to support the WAPs.
- Any active connection on ports 1-4 are to be moved to an available port on the current switch
- Require the pigtail to be unplugged from switch
- Connect the patch cord from the Cat6A the front loading Patch Panel to switch port
  - o Example:
  - $\circ$  WAP 1 is connected to APP1 port 1 to be connected to g1/0/1
  - $\circ$  WAP 2 is connected to APP1 port 2 to be connected to g1/0/2
  - Continue with deployment
- Require GigaBix field to be updated with the use of special service guard for the pigtails that were unplugged to show that the jack can no longer be used.
- Projects are required to execute the cross-connect moves.
- Requires Projects to plan ahead and monitor as the cross-connect is moved.

# **Example deployment below:**

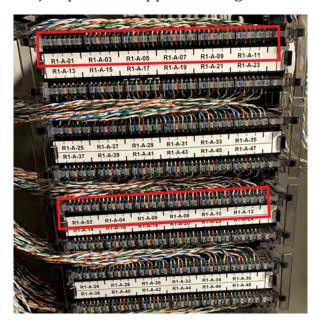
# Switch implementation example:

- Ports highlighted to indicate the designated ports that can be used
- Only the port to be used will have the active connection moved to an inactive port on the switch
- The switch port used will have the pigtail unplugged and it shall be dressed on the horizontal towel bar; if no towel bar exits, dress it with the associated pigtail bundle to keep it neat, and to make it easy to plug back to the switch port when required.
- Projects are required to execute the cross-connect moves. This activity shall not be left to PHSA NE field Technicians to complete.
- Requires Projects to plan ahead and monitor/fix the cross-connect moves the next morning for any port activation issues



# GigaBix Field implementation example:

- GigaBix field to have special service guard to be applied on the pigtails unplugged from the switch.
- Example:
  - o R1-A-01 pigtail unplugged
  - o Block jumper to be applied on GigaBix for R1-A-01



## **Logical Switch Stack Deployment:**

- Each switch in the switch stack will have the first 12 ports designated for use for Wireless deployments and used on an as-needed-basis.
- Ports will be freed up, starting with port 1 on each switch member progressively advancing to port 12 on each switch member in order to evenly distribute the WAPs across the stack.
- Ports used will depend on the number of WAPs needed to be deployed.
- As ports are used for Wireless deployments the pigtail(s) shall not be stored inside the VCM. They shall be dressed on the horizontal towel bar; if no towel bar exits, dress it with the associated pigtail bundle to keep it neat, and to make it easy to plug back to the switch port when required
- Require GigaBix field to be updated with the use of special service guard for the pigtails that were unplugged to show that the jack can no longer be used.
- Projects are required to execute the cross-connect moves. This activity shall not be left to PHSA NE field Technicians to complete.
- Requires Projects to plan ahead and monitor/fix the cross-connect moves the next morning for any port activation issues
- Requirement to maintain 20% or more port availability on the switch stack. If this cannot be maintained a new additional switch of the current-in-production model must be ordered as well as one bundle of 48 Cat6 pigtails.

# **Example deployment below:**

# Method of deployment:

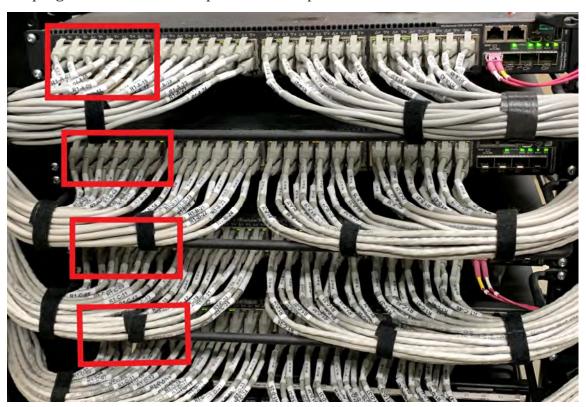
Switch stack 2 → Members in stack: 4

- Active connections before WiFi: 119
- New WAPs needed for activation: 21
- Total ports to be used on switch: 130
- Port availability: 62 ports or 32%
- Any active connections on the required ports on each switch are to be moved to an available port on the existing switch stack.
- Require the WAPs to be evenly distributed across the switch stack by starting with Port 1 on each switch member progressively advancing in sequential manner to port 12 on each switch member, based on the number of WAPs needed to be deployed
  - o Example:
  - All switch members are to be used for WAP deployment in order to evenly distribute the WAPs across the entire switch stack.
  - o Ports will be freed in the following manner:
    - Switch unit 1 port 1
    - Switch unit 2 port 1
    - Switch unit 3 port 1
    - Switch unit 4 port 1
    - Switch unit 1 port 2
    - Continue in sequential manner across all switch members up to port 12
- Require the pigtail to be unplugged from switch, connect patch cord from the Cat6A Patch Panel to the switch port as follows:
  - $\circ$   $\,$  WAP 1 is connected to APP1 port 1 to be connected to g1/0/1  $\,$
  - $\circ$  WAP 2 is connected to APP1 port 2 to be connected to g2/0/1
  - $\circ$  WAP 3 is connected to APP1 port 3 to be connected to g3/0/1
  - $\circ$  WAP 4 is connected to APP1 port 4 to be connected to g4/0/1

- $\circ$  WAP 5 is connected to APP1 port 5 to be connected to g1/0/2
- $\circ$  WAP 6 is connected to APP1 port 6 to be connected to g2/0/2
- 0 ....
- $\circ$  WAP 25 is connected to APP2 port 1 to be connected to g1/0/7
- o WAP 26 is connected to APP2 port 2 to be connected to g2/0/7
- WAP 27 is connected to APP2 port 3 to be connected to g3/0/7
- Continue in sequential manner across all switch members up to port 12
- Require GigaBix field to be updated with the use of special service guard on the pigtails that were unplugged to show that the jack can no longer be used
- Projects are required to execute the cross-connect moves.
- Requires Projects to plan ahead and monitor as the cross-connect is moved.

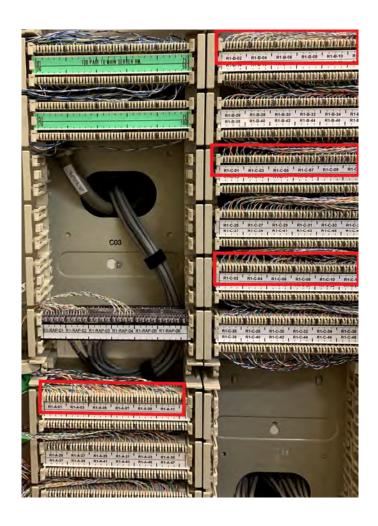
# Switch implementation example:

- Ports highlighted to indicate the designated ports that can be used
- Only the port to be used will have the active connection moved to an inactive port on the switch
- The switch port used will have the pigtail unplugged and it shall be dressed on the horizontal towel bar; if no towel bar exits, dress it with the associated pigtail bundle to keep it neat, and to make it easy to plug back to the switch port when required.



# GigaBix Field implementation example:

- GigaBix field to have special service guard to be applied on the pigtails unplugged from the switch.
- Example:
  - o R1-A-01 pigtail unplugged
  - o Block jumper to be applied on GigaBix for R1-A-01
  - o R1-B-01 pigtail unplugged
  - o Block jumper to be applied on GigaBix for R1-B-01
  - Continue in sequential manner by applying special service guard for all pigtails unplugged



## Reclamation of switch ports for Data/Voice or other:

If there is a need to use any of the first 12 switch ports on a switch member, which are reserved for APs, the following method will be used reclaim the spare ports as required

- Plug back pigtail as required, remove special service guard
- Cross-connect to the appropriate horizontal cable
- Work backwards in claiming the ports in the port positions 12, 11, 10 sequence, spreading the port reclamation evenly across the switches.

# **Exceptions to the rule:**

In the case that all 12 ports (whether a single switch or logical switch stack) be fully utilized, then any additional WAPs needed for deployment would then continue onto the 13<sup>th</sup> port. Again progressively advancing in sequential manner across the switch member(s) as needed, all the while keeping in check the 20% port availability on the switch stack.

PHSA Network Edge	FHA Manager
 Full Name	Full Name

Designated signatories for sign-off