

Large Optical Distribution Frame

Telecommunications Standard

Document information

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1. Purpose

a) The Purpose of this specification is to provide contractors and VicTrack operations staff a technical requirement which must, unless otherwise directed by VicTrack Telecommunications Engineering, be followed with when performing the installation and configuration of a Large Optical Distribution Frame (LODF).

2. Scope

a) This specification applies to the design, installation, configuration, labelling, operations and support of a VicTrack Large Optical Distribution Frame, within a telecommunications room.

3. Abbreviations

Abbreviation	Description
a/c	Air conditioner
AFFL	Above Finished Floor Level
AIRAH	Australian Institute of Refrigeration, Air Conditioning and Heating
AS	Australian Standard
AS/NZS	Australian and New Zealand Standard
BMS	Building Management System
CAP	Cable Attachment Plate
CCTV	Closed Circuit Television
CER	Communications Equipment Room
CET	Communications Earth Terminal (AS/ACIF S009)
CEMT	Cable Element Management Tray
CIS	Customer Information System
DB	1. Dry Bulb (in the context of temperatures) 2. Distribution Board (in the context of electrical wiring)
DTRS	Digital Train Radio System
DNO	Distribution
ELCB	Earth Leakage Circuit Breaker
EMI	Electro Magnetic Interference

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Abbreviation	Description
EPR	Earth Potential Rise
ERDB	Equipment room distribution board
FFE	Fittings, Furniture, and Equipment (supplied by purchaser)
FTP	Fibre Termination Panels
GPO	Electrical general purpose outlet (10A unless otherwise specified)
HVAC	High Voltage Alternating Current
IDF	Intermediate Distribution Frame
IEC	International Electro technical Commission
IFR	Issue for Review
IPnn	Ingress Protection Rating – Where nn = 2 digit number
LED	Light Emitting Diode
LODF	Large Optical Distribution Frame
LTR	Local Train Radio
MDB	Main Distribution Board
MDF	Main Distribution Frame
MODF	Medium Optical Distribution Frame
MTM	Metro Trains Melbourne
NUTR	Non-Urban Train Radio
OCS	Operational Control Systems
PCER	Prefabricated Communications Equipment Room
PTV	Public Transport Victoria
RAS	Remote Access System
RCD	Residual Current Device
SNMP	Simple Network Management Protocol
SODF	Small Optical Distribution Frame
SWR	Safe Working Radio
TRT	Train Radio Tower

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Abbreviation	Description
UPS	Uninterruptable Power Supply
VT	VicTrack
WB	Wet Bulb

4. Definitions

Definitions	Description
24x7	24 hours per day, 7 days per week When in regard to equipment availability, services may be temporarily unavailable allowing for scheduled maintenance, upgrades/renovation, or emergency repair.
Shall	Is used as the descriptive word to express a requirement that is mandatory to achieve conformance to the standard.
Should	Is used as the descriptive word to express a requirement that is recommended in other to achieve compliance to the standard. Should can also be used if a requirement is a design goal but not a mandatory requirement.
Specification	A set of high-level requirements that are mandatory to be adhered to achieve VicTrack's objectives.

5. Standards & References

a) The design and construction of all facilities will comply with but not be restricted to the minimum requirements as stated in the following Australian or International Standards and or Recommendations.

5.1. Australian Standards

Building Code of Australia:

- AS 1170 - Structural Design Actions (various);
- AS 1939 - Degrees of protection provided by enclosures for electrical equipment (IP Code);
- AS 9001 - Quality Systems;
- AS 1345 - Identification of Contents of Pipes, Conduits & Ducts;
- AS 1768 - Lightning protection;
- AS 2312 – Guide to the protection of structural steel against atmospheric corrosion using protective coatings;
- AS 3000 - Electrical Installations – Buildings, Structures & Premises (SAA Wiring Rules);
- AS 3008 - Electrical Installations – Selection of Cables;
- AS 3011 - Electrical Installations – Secondary batteries in buildings – Sealed Cells;
- AS 3013 - Electrical Installations – Classification of the fire and mechanical performance of wiring systems;
- AS 3080 - Telecommunications Installations- Integrated Telecommunications Cabling Systems for Commercial Premises;
- AS 3084:2003 - Telecommunications installations - Telecommunications pathways and spaces for commercial buildings;
- AS 3085 - Telecommunications Installations - Administration of Communications Cabling Systems;
- AS 3100 - Approval and test specification – General requirements for electrical equipment.

5.2. Australian Communications Authority Standards

- ACA TS 001 - Technical Standard - Safety Requirements for Communications Equipment;
- ACA TS 008 - Technical Standard - Requirements for Authorised Cabling Products;
- ACA TS 009 - Technical Standard - Installation Requirements for Customer Cabling (Wiring Rules).

5.3. VicTrack Standards

- TS-ST 005 Telecommunications Earthing Specification;
- TS-SP 013 Communication Cable Installation Specifications.

5.4. European Telecommunication Standards Institute Standards

(Re: Classification of environmental conditions)

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- ETS 300 019-1-0 – Part 1-0 Introduction;
- ETS 300 019-1-1 – Part 1-1 Storage;
- ETS 300 019-1-2 – Part 1-2 Transportation;
- ETS 300 019-1-3 – Part 1-3 Stationary use at weather protected locations.

5.5. References

- TIA 942 Telecommunications Infrastructure Standard for Data Centres;
- 2008 ASHRAE Standard – American Society of Heating, Refrigeration and Air- conditioning Engineers;
- TS-SP 013 Communication Cable Installation Specifications;
- TS-ST 042 Communications Equipment Room Brief;
- Australian Communications Industry Forum AS/ACIF S009:2006 Installation requirements for customer cabling (telecommunication networks).

6. Technical Requirements

6.1. Design

a) The VicTrack Large Optical Distribution Frame (LODF) is the VicTrack term for a specific racking solution for Optical Fibre Termination, splicing and patching for core or aggregation sites. The LODF is a scalable modular system capable of supporting optical fibre lead in splice/patch core counts of at least 768 cores.

b) The main advantages that the LODF offers over installing Fibre Termination Panels (FTP) in equipment racks are the fibre capacity per rack is far greater and the fibre management provided by the LODF is far superior.

c) LODF component parts and basic functionality.

1. Splice/Patch Fibre Termination

Will be provided as per each fit out's detail design pack within the LODF. Lead-in loose tube fibre cables shall be terminated and spliced to the front presenting SC/APC connectors in the sub racks.

2. Lead in Cable Sheath Termination

Termination, routing and management to be as per vendor and manufacturer's specifications.

3. Loose Tube Management and Termination

The loose tubes after the break out box are protected and managed as per vendor and manufacturer's specifications.

6.2. Vendor Documentation

a) The vendor provided documentation must be adhered to when installing a LODF.

6.3. LODF Specifications

a) The LODF shall be no greater than 1200mm wide, including side duct and cable managements, 300mm deep and 2200mm high.

b) The LODF shall have solid side panels with lockable doors. Light coloured panels and frames.

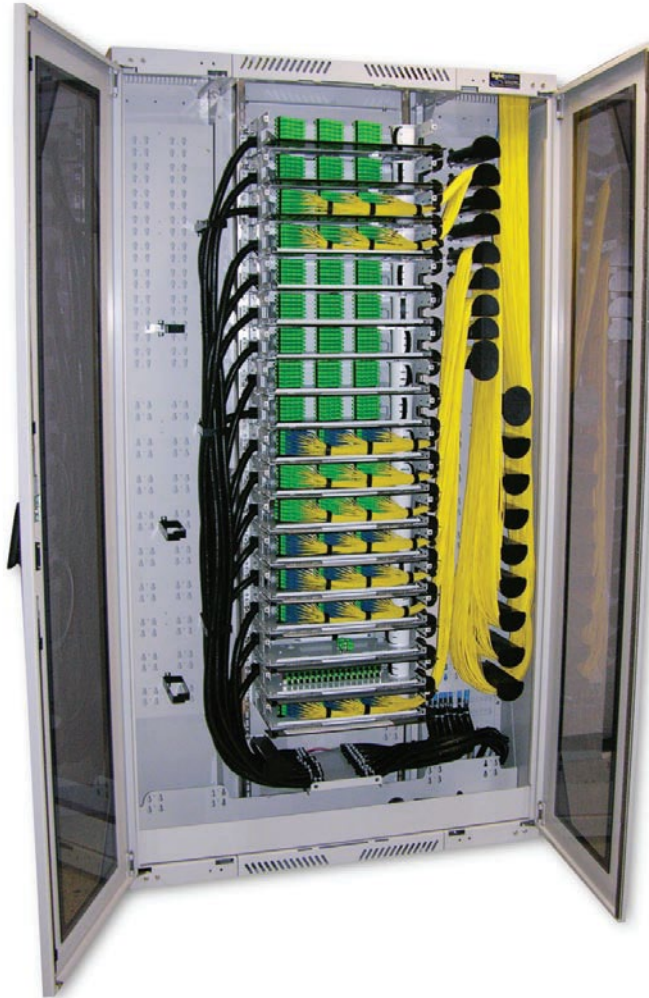
c) Cable management shall be internally on one side of frame.

d) Patch lead management shall be internally on the other side of frame.

e) The LODF shall have built in spools for internal management of fibre patch leads.

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- f) The LODF shall have top or bottom entries for cables and patch leads.
- g) The LODF shall be able to maintain minimum bend radii for all fibre cables and fibre patch leads.



1. An Example of a LODF

- h) The LODF shall incorporate a Cable Element Management Tray (CEMT), a distribution point for terminating lead in sheath and cable strength members, a 21mm Nylon conduit is then used to route loose tubes to their allocated fibre panels.

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2. Example of break out box, 1 into 2 (Plastic)

- i) Optical cables, pigtails and patch leads shall be organised, stored and mechanically protected in the side ducts of the rack.
- j) Lead-in cables shall enter the rack from either the top or bottom (under floor) entry.
- k) Additional cable attachment plate and C-profile accessories available from the vendor may be required.
- l) Patch leads from equipment shall enter or exit from the top and shall be managed into their respecting equipment side fibre panel.

6.4. Optical Fibre Sub Rack

- a) The LODF shall use SC/APC through connectors, front presenting.
- b) The LODF shall support 19" mounting for FTPs.
- c) The LODF shall allow fitment and mounting of 1RU, 2RU and 3RU 19" FTPs.
- d) The LODF shall front presented SC/APC connectors on FTPs.
- e) SC/APC connectors on flat tray type FTPs shall not be allowed.

6.5. Deployment Rules

- a) The VicTrack LODF is intended for deployment in all new core sites and core sites, including fibre infrastructure retrofits.
- b) The LODF can also be deployed in aggregation sites as required.

6.6. Line and Equipment Sub Racks

- a) The sub racks used on a LODF serve two main functions: Line and Equipment.

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b) Sub racks serving a lead-in termination function are known as line sub racks and provide a termination point for outside plant optical fibre lead-in cables.

c) Sub racks serving an equipment function are known as equipment sub racks and provide a termination point for all optical ports.

6.7. Rack Layout

a) RU mounting labels shall be applied to both sides of the frame.

- **Cable Element Management Tray (CEMT)**

The CEMT will occupy RU positions 0-5

- **Line Sub Racks**

Line sub racks will occupy the bottom half of the main rack, as per each fit out's detail design pack.

- **Equipment Sub Racks**

Equipment sub racks will occupy the top half of the main rack, as per each fit out's detail design pack.

- **Lead-in Cable**

Lead-in cables will enter from either the top cable duct and be managed behind the cable spool management tray or via base ducts for underfloor cables.

Lead-in cables not requiring their loose tube to be split over sub racks will have their sheaths and strength members secured on the C-Profile bars and Cable Attachment Plates (CAP).

Cables requiring loose tube splitting will utilize a break out box mounted on the Cable Element Management Tray (CEMT). Loose tubes will be protected by a 21mm black nylon transport tube secured between the break out box and line sub rack.

- **Equipment Cable**

Equipment cables will enter from the top cable duct from overhead fibre ducting or via base ducts for underfloor cables.

- **Cross Connect / Patch Leads**

Cross connection patch leads within the LODF, will be 2mm SMOF patch leads, and will be managed in side duct. Patch leads run between the line and equipment sub racks will follow the patching methodology as per vendor and manufacturer's specifications.

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7. Installation

7.1. Assembling LODF

a) Installers shall follow the vendors and manufacturer's Installation Guide except where this document directs otherwise.

7.2. Mounting LODF to Solid Floors

a) In conjunction with the Installation Guide, the rack shall be secured to the floor with suitable masonry anchors. Dynaset™, Ramset™, and Dynabolt™ are examples of acceptable masonry anchors.

7.3. Mounting LODF on Raised Floors

a) Where an overhead superstructure is available, the rack shall be secured to the overhead at no less than two points.

b) Where overhead superstructure is not available, the rack is to be secured to a length of Unistrut (Typically the total length of the rack assembly) which is mechanically secured to the slab under the raised floor.

c) The Rack is then to be secured to the Unistrut through the raised floor tile by M12 threaded rod.

7.4. Wall Mounting of LODF

a) Where the LODF is to be secured to a wall, the standard supplied wall mounting bracket is to be used with the appropriate fastening methodology.

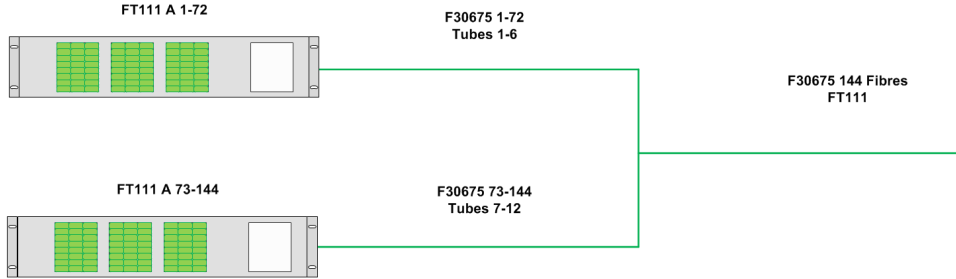
7.5. Mounting Sub Racks

a) Assemble and configure the fibre termination sub racks as per vendor and manufacturer's instructions.

7.6. Sub Racks and Fibre Termination (FT) Numbers

a) Where a cable is split across two or more termination panels the two sub racks will retain the same panel letter; the core count terminated on that panel will be added after the Panel letter.

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3. Sub Racks and FT's

All Sub Racks will require a VicTrack specific port numbering label to be applied. These labels will replace the manufacturer's standard label on the flip down cover label and splice tray label.

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4. VicTrack Sub Rack port layout

7.7. Labelling

a) Label the LODF as per detailed design pack.

The following shall be labelled:

7.7.1. LODF

a) Each LODF is to be labelled as per the detailed design pack. The label is to be placed on the frame's top and centre of the beam, in Black on White lettering no smaller than 30mm font.

b) RU mounting labels will need to be applied to both sides of the rack. These are to be Rack Technologies P/N 9250 or equivalent.

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7.7.2. Sub Rack

a) The sub rack label must be attached to the outside and inside of the swing down cover. The label is to include in this order: FT number, panel letter, and fibre range.

Example: FT1111-A 1-72

b) This label is to be no smaller than 10mm, Black on White.

c) Where cable loose tubes are split across sub racks, the fibre range is to be adjusted.

Example:

FT1111-A 1-72

FT1111-A 73-144

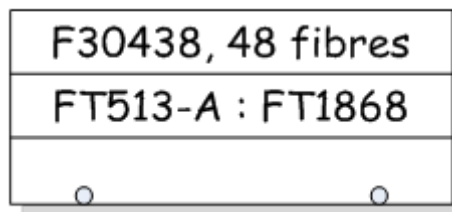
7.7.3. Cable Sheath

a) The cable sheath is to be labelled after the sheath clamp on the C profile bracket and before the break out box.

b) The label will be Panduit Self Laminating Tag part number PST-FO or equivalent.

c) The Label is to include in this order: Cable number, fibre core count, A-End, FT number, B-End, FT number.

Example:



5. Typical Cable Sheath Label

7.7.4. Loose Tube Nylon Conduits

a) The loose tube nylon conduits shall be labelled between the break out box and the first U clamp.

b) The label shall be Panduit Self Laminating Tag part number PST-FO or equivalent.

c) The Label is to include in this order: Cable Number, Core Count, Tube Numbers

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Example:

F30675 73-144

Tubes 6-12

7.7.5. Side Duct Cable Spools

a) The side duct cable spools are to be labelled be as per vendor and manufacturer's specifications.

8. Cabling Methodology

8.1. Lead Cable Entry and Management

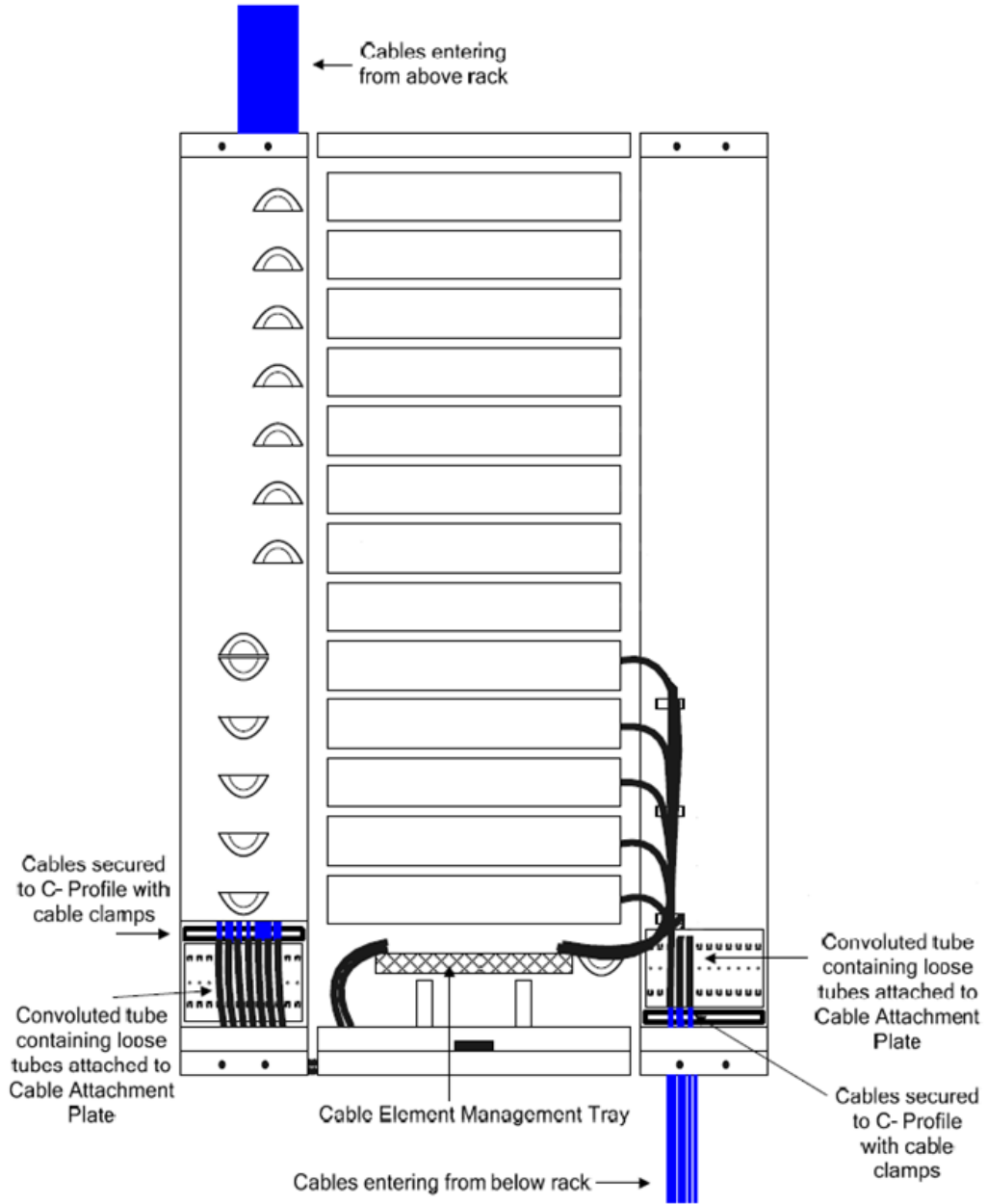
a) Cable entry for lead-in cables is typically via the top cable duct and proceeds down behind the side of the duct plate and reappears at the bottom of the side cable duct.

b) At installation, cable spools are to be installed and labelled as per vendor and manufacturer's specifications.

c) Where the lead-in cable is to enter the LODF from the base of the rack the lower CAP and C profile Bracket are to be used to manage the cable.

See Figure 6 Below.

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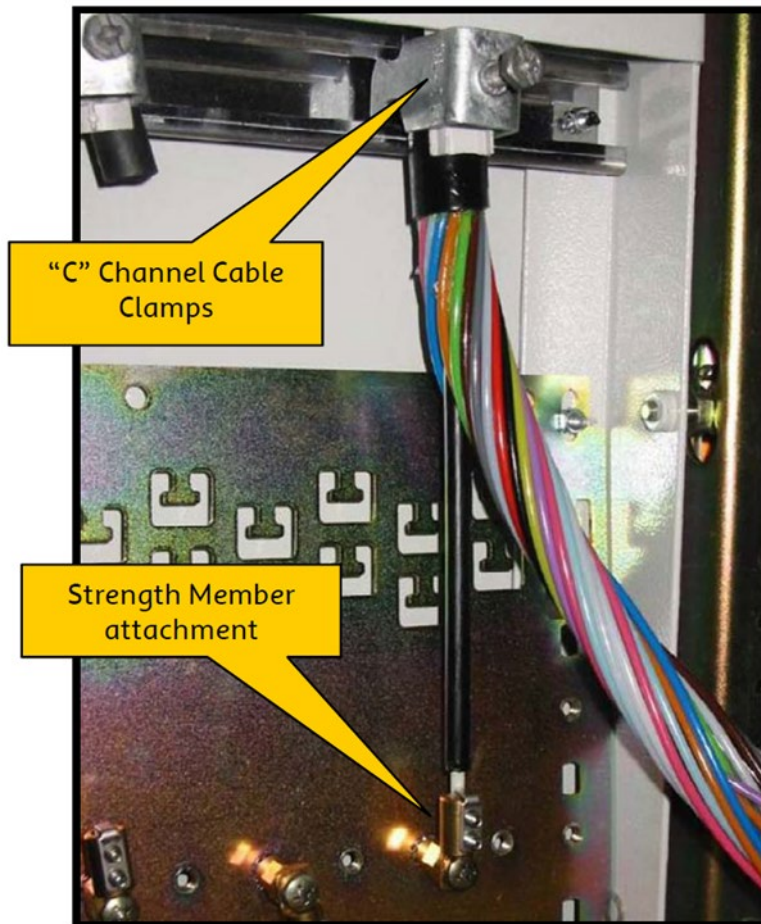
6. Example of Lead in Cable Management

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8.1.1. Non Splitting Loose Tubes

a) For Smaller lead in cables, typically less than 72 core, there is no requirement to split loose tubes between termination sub racks and the following standard is to be applied.

b) The cable sheath shall be secured to the C Profile brackets provided and the strength member shall be secured to the strength member attachment mounted on the Cable Attachment Plate.

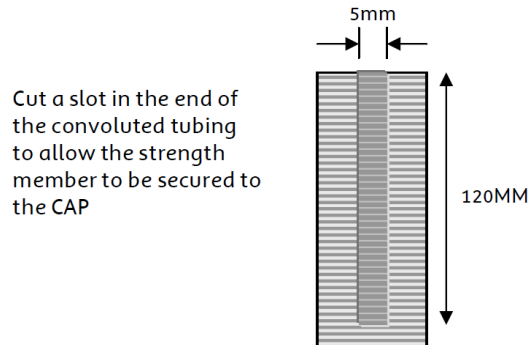


7. Typical Sheath and Strength Member Termination

c) Measure the required length of 21mm Nylon conduit from the CAP to fibre termination sub rack.

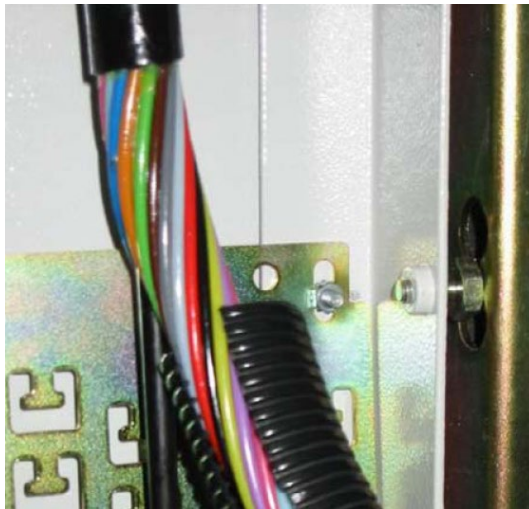
d) The 21mm Nylon Conduit shall be slotted as shown in figures below.

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8. Slotted Nylon Conduit

e) The slotted 21mm Nylon conduit shall be placed over the cable sheath with the slot aligned with the strength member and secured with a cable tie.



9. Slotted Conduit and Strength Member

8.1.2. Splitting of Loose Tubes

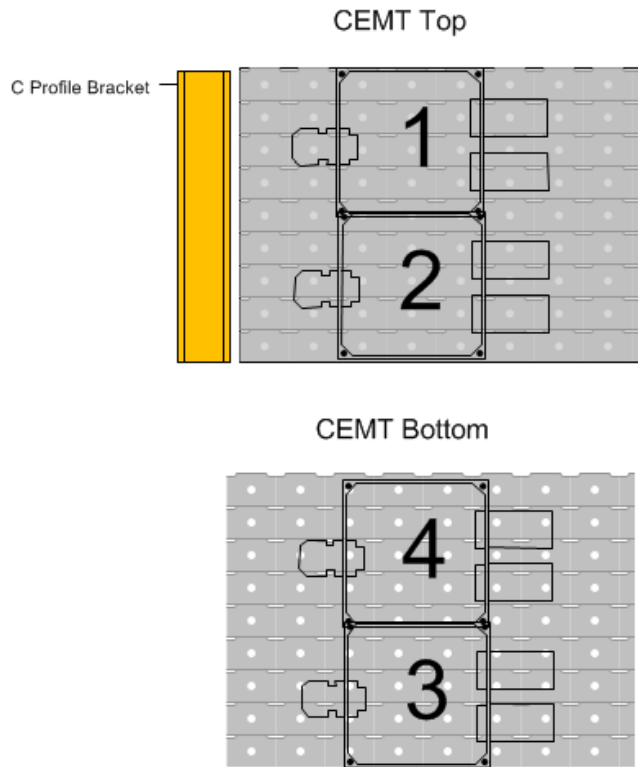
- Where the cable exceeds 72 cores, the loose tubes shall be split across multiple fibre termination sub racks.
- This is done to maintain a manageable amount of fibre splice trays in each panel.
- Splitting of the loose tubes between panels shall be achieved via the use of a break out box.

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10. Example of break out box, 1 into 2 (Plastic)

d) Position the break out box as per the figure below and secure to the CEMT using suitable threaded screws.



11. CEMT Layout

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e) Secure the lead-in cable sheath to the C profile bracket, measuring the necessary distance between the C profile bracket and breakout box, secure the cable sheath via the supplied grommet and terminate the strength member.

f) Measure the necessary length of loose tube and 21mm Nylon conduit.

g) Thread the loose tube into the nylon conduit and secure to the break out box.

8.2. Equipment Cable Entry and Management

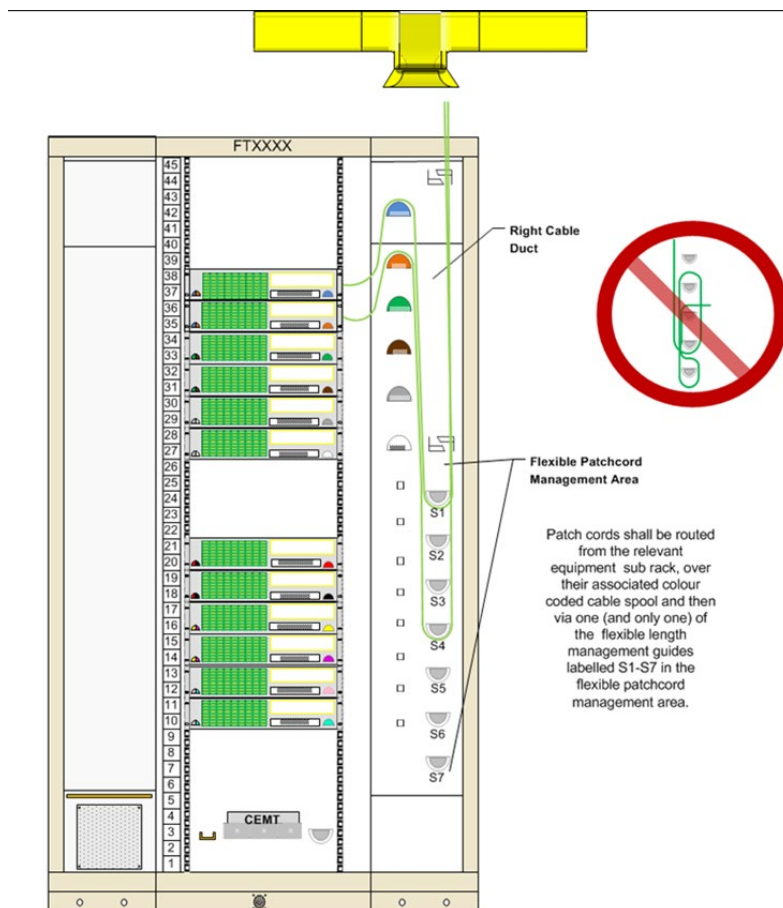
a) Equipment cables will enter from the top cable duct from overhead fibre ducting, and installed following the Lead cable entry and management methodologies above...

b) At installation, cable spools shall be installed and labelled as per vendor and manufacturer's specifications.

9. Patching Methodology

9.1. Equipment Rack Patch Lead Entry and Management

- a) Patch leads from Equipment Racks into the LODF shall only to be patched to the front of the FTPs.
- b) Equipment patch leads from the LODF shall use the provided fibre ducting and conduits to the equipment sub rack.
- c) Only a limited span of excess patch lead lengths shall be managed via the flexible patch cord management area.



12. Example of Equipment Rack Patch Lead Methodology

9.2. Equipment Sub Rack to Sub Rack Patch and Management

- a) Any patch leads within the LODF shall be routed from the relevant equipment sub rack, over their associated cable spool and then via one (and only one) of the flexible length management guides as per vendor and manufacturer's specifications.

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b) Only a limited span of excess patch lead lengths can be managed via the flexible patch cord management area.

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10. Document Review and Approval

Delegation	Name	Position	Version	Date
Owner	Kathryn Shoolman	Manager Infrastructure Design	6.0	07/02/2020
Reviewers	Choi Hardisty	Fibre Design Officer PDG	6.0	07/02/2020
	Ross Johnston	Team leader Internal Plant	6.0	07/02/2020
Approver	Bruce Moore	General Manager Telco	6.0	07/02/2020

11. Document History

Version	Amendment description	Author	Date
6.0	On-going overhaul of LODF methodology and layouts	John Berti	07/02/2020
5.0	Upgraded document to new template	Dale Goddard	31/10/2018
4.0	Labelling code changed to color	Ian Merrick	22/01/2016
3.0	Document Number added	Ian Merrick	22/05/2015
2.0	Port layout changed	Ian Merrick	28/04/2015
1.0	Initial Draft	Ian Merrick	20/04/2015

12. Review Period

This standard will be reviewed at every two (2) years by the document owner, or amended as appropriate.