

Suppliers' Information Note

For The Openreach Network

Ethernet Cablelink (EBCL)

Service & Interface Description

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1. Introduction

This Suppliers' Information Note (SIN) is an Openreach ancillary document. It contains important information about the Cablelink product which our customers ("you") need to understand.

As we introduce or withdraw product features, or otherwise develop our services, we will make changes to this document in line with the change process for ancillary documents in our product contracts.

Cablelink is a product with three internal, one external fibre link and one cell site option to allow connectivity into the Openreach infrastructure and BT Exchanges.

This document provides a summary of information relating to the Ethernet Cablelink product only and does not refer to GEA Cablelink.

2. Service Outline

2.1 General

The Ethernet Cablelink product suite connects your equipment within a Licensed Facility to your network, or between two spaces within the same building which are not next to each other.

There are five variants of the Ethernet Cablelink product; one external variant, three internal variants and a Cell Sites variant, providing Exchange based network connection solutions for CP's equipment and their network requirements.

Internal Cablelink offers installation within the Exchange building by Openreach of an internal quality multi-fibre cable. These Internal Variants provide either 12, 24 or 48 connected fibres per order.

External Cablelink has options for Openreach to pull in a single 24, 48, 96, 144 or 288 fibre external cable from the handover point (the "Openreach handover box") to the Exchange Cable Chamber. This is then spliced to a single 24, 48, 96 or 144 fibre internal cable which will be routed to a Licensed Facility location within the Exchange. In the case of a 288 fibre external cable being pulled in, this will be spliced to 2 x 144 fibre internal cable.

Where a CP requests that Openreach install 12 fibre Optical Patch Panels, these will be done in multiples of 12 fibres as per the table below –

Internal Variants 1, 2 & 3	Fibre count	Patch Panel not required	Patch Panel required	Patch Panel quantities
	12f	12f COF	12f COF in multiples to achieve fibre count requested by CP i.e. if CP requests 48 fibres to be terminated, then 4 x 12f COF and 4 x 12 port Patch Panels	1 per End
	24f	24f COF*		up to 2 per End
	48f	48f COF*		up to 4 per End
External variants	Fibre count	Patch Panel not required	Patch Panel required	Patch Panel quantities
	24f	24f COF*	12f COF in multiples to achieve fibre count requested by CP i.e. if CP requests 144 fibres to be terminated, then 12 x 12f COF and 12 x 12 port Patch Panels	up to 2
	48f	48f COF*		up to 4
	96f	96f COF*		up to 8
	144f	144f COF*		up to 12
288f	2 x 144f COF*	up to 24		

* Unless otherwise requested by the CP at order entry

With the introduction of Openreach Physical Infrastructure Access (PIA), an alternative point of handover could be the Exchange manhole, where a CP is established to use PIA duct.

Whether an Openreach handover box or the Exchange manhole is utilised, consideration will need to be given to ensure that there is sufficient capacity for the CP's external cable to be left coiled. This is why the location of the point of handover should ideally be no more than 100 metres from the Exchange manhole. Exceptionally, it could be agreed for the CP to provide their cable directly to Openreach and for Openreach to cable from the Exchange manhole to the handover box.

Cell Sites Cablelink has options for Openreach to provide either a 24 or 48 fibre cable from a CP's Licensed Facility within an Exchange building to an external Cell Site, located on the rooftop or within the curtilage of the same Exchange building.

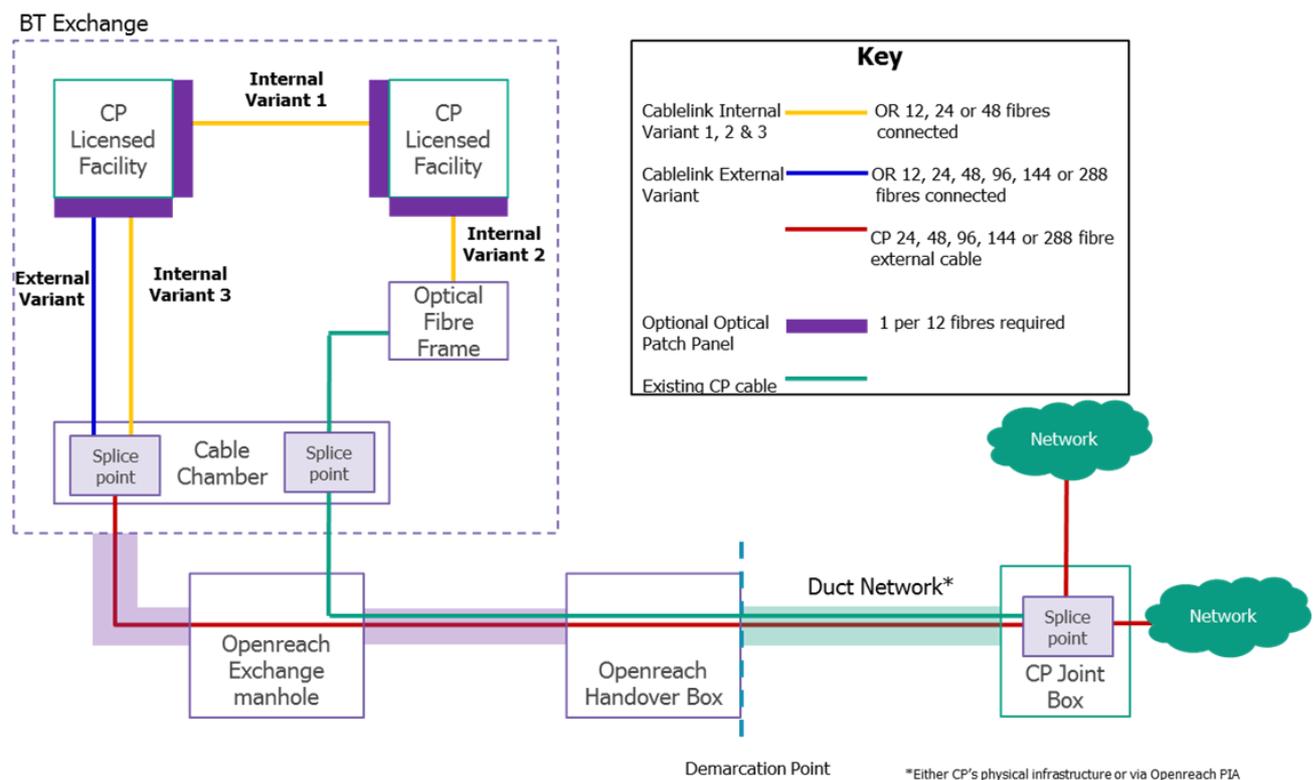


Figure 1 Schematic diagram for Cablelink variants

3. Cablelink Service Features

3.1 Optical Fibre Cable specifications

This section provides a summary of the Optical Fibre Cable that can be used by Openreach and by CPs for this product. These are shown in the following subsections, which are split into Openreach Cable Optical Fibres (COF) (external and internal) and then CP cables (external).

3.1.1 Cables for Installation in Underground Ducts

These cables are designed for installation in underground ducts, and limited internal length to a transition node. Openreach use COF200 for this purpose and Table 1 provides a summary of this cable type.

Cable Element / Detail	COF200
Number of fibres in cable	12 to 144 fibres in 12 fibre elements
Fibre Type	The cables contain primary coated single mode optical fibres in accordance with ITU-T Recommendation G.657.A.
Central Strength Member	Glass Reinforced Plastic. Coated in black polyethylene of a suitable grade.
Stranded Layer (elements stranded around central strength member)	1 to 12 polymeric tubes of a maximum outside diameter of 2.0mm, each containing 12 colour coded fibres and Gel type water blocking compound. 1 insulated copper conductor 0.5mm in diameter. Polymeric dummy tubes (where necessary).
Optical Fibre Identification	The fibres in each tube are coloured for identification purposes. The fibres are coloured in accordance with Table 4 of this SIN
Loose Tube Identification	The colour scheme used for the loose tubes can be seen in Table 5 of this SIN.
Water blocking materials within interstices of Stranded Layer	Water swellable threads / tapes materials present.
Binder Layer (material surrounding stranded layer)	Threads and / or tapes of typically polyester, water swellable material etc.
Ripcords	Two, laid over the binder layer.
Insulated Copper Conductor	A solid wire of standard annealed copper insulated with polyethylene compound
Cable Sheath Construction	Black polyethylene sheath of a suitable grade. This will have a minimum diameter of 1.00mm and

	elements within shall not produce a corrugation effect on the sheath.
Cable Sheath Marking	Markings to indicate optical telecommunications cable + the legend COF200XXXF (XXX = Number of fibres in cable).
Cable Outside Diameter	12mm to 13.5mm (single layer construction)
Cable Jointing	The fibres are jointed using fusion splicing techniques. The cable joint closure (where applicable) is installed to the cable sheath using either mechanical or heat shrink techniques.

Table 1 COF 200 properties (external cable)

3.1.2 Cables for Installation in BT Buildings

These cables are designed for installation in buildings only. These cables must have a minimum fire performance classification of Cca s1b, d1, a2. Openreach use COF950 for this purpose and Table 2 provides a summary of this cable type.

	COF950 12F	COF950 24F	COF950 36F	COF950 48F	COF950 96F	COF950 144F
Central Strength Member	0.7mm glass reinforced plastic (GRP)				1.5mm GRP coated up to 2.5mm using Halogen-free flame-retardant thermoplastic material in accordance with BS EN 50290-2-27	1.6mm GRP coated up to 4.2mm using Halogen-free flame-retardant thermoplastic material in accordance with BS EN 50290-2-27
Optical Fibre	The cables contain primary coated single mode optical fibres in accordance with ITU-T Recommendation G.657.A.					

Optical Fibre Identification	The fibres in each tube are coloured for identification purposes. The fibres are coloured in accordance with Table 4 of this SIN.					
Stranded Layer (elements stranded around central strength member)	1 polymeric 'easy peel' blue tube containing 12 colour-coded fibres. The tube is 'dry', i.e. do not contain Gel type water blocking compound. There are 3 Polymeric dummy tubes.	2 polymeric 'easy peel' tubes (blue and orange) containing 12 colour-coded fibres. The tubes are 'dry'. There are 2 Polymeric dummy tubes.	3 polymeric 'easy peel' tubes (blue, orange, green) containing 12 colour-coded fibres. The tubes are 'dry'. There is 1 Polymeric dummy tube.	4 polymeric 'easy peel' tubes (blue, orange, green, brown) containing 12 colour-coded fibres. The tubes are 'dry'. There are no Polymeric dummy tubes.	8 polymeric 'easy peel' tubes (in TIA colours) containing 12 colour-coded fibres. The tubes are 'dry'. There are no Polymeric dummy tubes.	12 polymeric 'easy peel' tubes (in TIA colours) containing 12 colour-coded fibres. The tubes are 'dry'. There are no Polymeric dummy tubes.
Loose Tube Identification	The colour scheme used for the loose tubes can be seen in Table 6 of this SIN.					
Binder/Wrapping Layer (material surrounding stranded layer)	There are no binder tapes/wrapping materials. A layer of e-glass fibres provides additional strength and further flame protection					
Ripcords	A single rip cord is found under the sheath					
Water blocking materials within cable	No materials present					
Cable Sheath Construction	Yellow Ultra Low Smoke Zero Halogen flame-retardant thermoplastic material in accordance with BS EN 50290-2-27.					
Cable Sheath Marking	Markings to indicate optical telecommunications cable + the legend COF950XXXF (XXX = Number of fibres in cable).					
Cable Outside Diameter	6.6 ±0.3mm			8.4 ±0.3mm	10.2 ±0.5mm	

CPR Fire Performance	The cables meet the fire performance requirements of BS EN 50575 with a minimum classification of Cca s1b, d1, a2.
Cable Jointing	<p>The fibres are jointed using fusion splicing techniques.</p> <p>The cable joint closure (where applicable) is installed to the cable sheath using either mechanical or heat shrink techniques.</p>

Table 2 COF 950 properties (internal cable)

3.1.3 Communication Provider’s optical fibre cable

The minimum requirements that CPs external optical fibre cable shall meet in order for it to be connected to the Openreach Network are detailed in this section. The cable shall be of a robust construction and shall be suitable for installation in underground ducts. A cable similar to/the same as COF200 would be appropriate.

3.1.3.1 Optical Fibre

The cable shall contain primary coated single mode fibre in accordance with ITU-T Recommendation G.652 or G.657.A.

3.1.3.2 Optical Fibre Identification

The fibres in the cable shall be identified by the nomination of a declared colour code.

3.1.3.3 Fibre element

Each fibre element shall contain 12 fibres.

3.1.3.4 Cable Diameter

The diameter of the cable shall be in the range 12 to 25mm.

3.1.3.5 Cable Sheath Marking

The sheath shall be marked with the following information:

- Identity of cable owner
- Markings to identify the cable as an optical telecommunications cable

3.1.3.6 Cable Labelling

The CP will attach a label at the end of the cable and at the point where the cable enters the handover box or exchange manhole with the following information:

- EBCL Reference (e.g. EBCL100199)

3.1.3.7 Cable Materials

All the materials within the cable shall be in accordance with the latest COSHH regulations.

3.1.3.8 Cable Jointing

It shall be possible to joint the fibres by the use of fusion splicing techniques.

It shall be possible to install the cable joint closure to the cable using either mechanical or heat shrink techniques without damage to the component parts of the cable.

At the point of connection, Openreach personnel or Contractors will joint the CP cable to the Openreach COF950 cable in accordance with Table 3 of this SIN.

3.1.3.9 Cable Entering A BT Building

The cable is only permitted to be routed from the underground duct network infrastructure, through the bulk head duct seal and into the cable chamber of the BT Building.

The cable shall be cut in the cable chamber of the BT Building and jointed to a cable designed for internal use.

The cable design shall permit the fitting / provision of a gas block. The gas block shall be fitted to the cable end in the cable chamber. The cable owner shall provide a works practice and confirm that their cable is suitable for use with 10B Closure Sealant Kit. The materials for the gas block shall meet the latest COSHH regulations.

3.2 Cable management

CPs need to be aware of the following points, which contain requirements for CP obligations relating to the Cablelink product and which are critical to the successful installation of Cablelink -

- Use of sub-duct – CPs will remove any sub-duct before their cable is introduced to the handover box, i.e. no sub-duct to be present in the handover box.
- Coiling cable in the handover box – for cable management purposes, the length of cable to be coiled should be as agreed at the Site Survey, i.e. sufficient to reach the Cable Chamber and to allow for splicing to the internal cable. CPs will not leave excessive cable coiled in the handover box.
- Cable labelling – CP cable will be correctly labelled with the relevant EBCL reference at the cable end and at or close to, the duct entry point of the handover box.
- Splicing schedule – see Table 3 and splice fibre colour to fibre colour.

Alignment of Element Tubes							
144 Fibre Cable	COF950 (Coloured Elements)			BT Colour (Coloured Elements)		BT Colour (Marker/Reference Elements)	Please see key below
Element 1	Blue	→	→	Blue	Element 1	Red	
Element 2	Orange	→	→	Orange	Element 2	Natural	
Element 3	Green	→	→	Green	Element 3	Natural	
Element 4	Brown	→	→	Red	Element 4	Natural	
Element 5	Grey	→	→	Grey	Element 5	Natural	
Element 6	White	→	→	Yellow	Element 6	Natural	
Element 7	Red	→	→	Brown	Element 7	Natural	
Element 8	Black	→	→	Purple	Element 8	Natural	
Element 9	Yellow	→	→	Black	Element 9	Natural	
Element 10	Purple	→	→	White	Element 10	Natural	
Element 11	Pink	→	→	Pink	Element 11	Natural	
Element 12	Turquoise	→	→	Turquoise	Element 12	Green	
96 Fibre Cable							
Element 1	Blue	→	→	Blue	Element 1	Red	
Element 2	Orange	→	→	Orange	Element 2	Natural	
Element 3	Green	→	→	Green	Element 3	Natural	
Element 4	Brown	→	→	Red	Element 4	Natural	
Element 5	Grey	→	→	Grey	Element 5	Natural	
Element 6	White	→	→	Yellow	Element 6	Natural	
Element 7	Red	→	→	Brown	Element 7	Natural	
Element 8	Black	→	→	Purple	Element 8	Green	
48 Fibre Cable							
Element 1	Blue	→	→	Blue	Element 1	Red	
Element 2	Orange	→	→	Orange	Element 2	Natural	
Element 3	Green	→	→	Green	Element 3	Natural	
Element 4	Brown	→	→	Red	Element 4	Green	
36 Fibre Cable							
Element 1	Blue	→	→	Blue	Element 1	Red	
Element 2	Orange	→	→	Orange	Element 2	Natural	
Element 3	Green	→	→	Green	Element 3	Natural	
24 Fibre Cable							
Element 1	Blue	→	→	Blue	Element 1	Red	
Element 2	Orange	→	→	Orange	Element 2	Natural	
12 Fibre Cable							
Element 1	Blue	→	→	Blue	Element 1	Red	

Key:
 First tube (marker), the red tube containing optical fibres or the tube containing optical fibres adjacent to the red dummy tube element.
 Last tube (reference), the green tube containing optical fibres or the tube containing optical fibres adjacent to the green dummy tube element.

Table 3 Loose tube jointing arrangement (COF950)

3.3 Optical Loss for Cablelink

Openreach will undertake reasonable endeavours to ensure splice losses are $\leq 0.3\text{dB}$ at 1310nm, in accordance with ITU-T L.12 Recommendation.

However, splice losses in excess of 0.3dB may be found if uni-directional measurements are taken with an OTDR. This is due to fibre characteristics, with the OTDR measuring backscatter of these and not the splice itself.

Unless otherwise stated all measurements shall be conducted at the nominal wavelengths of 1310nm and 1550nm.

These higher splice losses are acceptable providing that the overall optical performance of the route does not exceed the overall link loss budget.

Given Openreach does not have visibility of the overall link loss budget, an Ethernet Cablelink service will be considered faulty if:

The CP bi-directional average of the OTDR readings for a splice are <0.3dB at 1310nm.

Openreach require bi-directional test results to be submitted by the CP in accordance with ITU-T L.12 Recommendation.

The bi-directional average is calculated using the methodology in ITU-T G.650.3.

CP measurements shall be made using a referenced Optical Power Meter (OPM) and Optical Light Source (OLS) at 1310nm and 1550nm. All measurements are to be in dB using the two-cord reference method (IEC and BS EN 61280-4-2).

PMD, CD and ORL analysis should be negotiated as part of the product contract.

3.4 Testing Connectivity

All test equipment connections to the fibres in the cable (ECS) shall be made using either:

1. A pigtail cable and a temporary fusion splice.
2. A patch cord to connect to the ECS via a terminating patch panel.

Prior to connection all optical connectors must be cleaned and inspected. For details of inspection procedures please refer to BS EN 61300-3-35. For details of cleaning procedures please refer to IEC/TR 62627-01.

3.5 Patch Panel termination

When a CP requests Openreach to install a patch panel it will be 1U high and utilise SC/APC connectors.

The Splice and Patch panel is designed to be installed into a 19” rack. Optionally, the Splice and Patch panel may be fitted instead into an ETSI 535mm rack.

This will be a 12 port optical patch panel and will be installed in multiples of 12, i.e. a 48f optical cable will be terminated in 4 x 12 port patch panels.

An example can be seen in Figure 2.

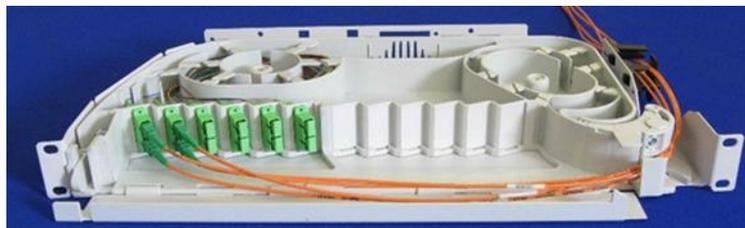


Figure 2 Splice and patch panel

4. Repair (T2R - Trouble to Resolve)

4.1 Repair

It is the responsibility of the CP to notify Openreach when it believes any Cablelink service is faulty. You must provide the EBCL reference relating to the faulty cable to Openreach. Faults can be reported via eCo repair and will be managed by the Openreach Customer Management Centre (CMC). The CMC can be contacted on 0800 028 2268 on a 24/7 basis.

For External Cablelink, Openreach responsibility commences from the handover point (Handover Box or Exchange Manhole), where your fibre cable was gifted to Openreach and ends at your splice (or the Optical Patch Panel/Shelf where this has been provided by Openreach). For all other Cablelink variants, our responsibility is restricted to the fibre cable only, or the Optical Patch Panel/Shelf where this has been provided by Openreach. Cablelink covers only the fibre cable and NOT the services provided through it. It should be noted that Openreach can only investigate faults due to physical damage, a fibre performance issue (latency) or degradation of the cable, including splices.

You should prove faults onto the Openreach section of cable before reporting any suspected fault. The CP needs to carry out bi-directional testing in accordance with ITU-T L.12 Recommendation, clause 5.6. By providing a bi-directional OTDR trace at 1310nm and 1550nm of the faulty fibre, this may reduce the time taken by Openreach to repair the service.

Openreach Repair will keep you informed via regular KCI (Keeping Customer Informed) bulletins. If no fault is found in the Openreach fibre cable or if the required details needed to identify the correct fibre have not been provided, resulting in abortive work, this activity will be charged for. Openreach repair will confirm the fault has been cleared and service restored.

4.2 Rapid Rearrange

There may be times where CPs identify an issue with their Cablelink after it has been handed over to them by Openreach. A Provisioning issue is defined as –

- Openreach have not spliced all of the fibres requested by the CP
- Openreach have spliced to the wrong cable
- Cablelink terminated in the wrong location
- Optical Patch Panel/Shelf has not been installed, even though the CP has requested a Patch Panel/Shelf to be installed at the time of placing the original Cablelink order
- Openreach have pulled in the wrong external cable from the Openreach handover point in to the cable chamber
- There is a quality issue regarding how Openreach have run the cabling in the CP's rack
- Customer has never been able to send / receive traffic over the Cablelink due to some / all fibres not being spliced on internal cables within the Exchange

In these scenarios, the CP can raise a Rapid Rearrange case on SI (in the same way that they do for EAD provision issues).

5. Optical Safety

5.1 General

All transmission equipment connected to Openreach's network must either incorporate sufficient safety features (ALS/APR/APSD) and/or not exceed Class 1M. This ensures the maximum optical power hazard level of accessible emission that Openreach people working on the network may be exposed to is no greater than Class 1M. As per:

- IEC 60825-2 2004 Safety of laser products — Part 2: Safety of optical fibre communication systems (OFCS)

All Visual Fibre Identifiers, aka, Visible Light Sources must adhere to Class 2 laser. As per:

- IEC 60825-1 2014 Safety of Laser Products – Part 1: Equipment classification and requirements, and must not exceed an optical power of 1mW

We will expect CPs to confirm their adherence to this requirement as part of the establishment process to consume the product.

Under no circumstances should laser power levels above those defined be applied to any part of the Openreach network. Higher optical powers present a significant risk to Openreach or CP's people working on the network. Any laser power levels identified as being above the agreed safe limit will be immediately isolated from the Openreach network on safety grounds. This may cause an interruption of service whilst an investigation takes place and may ultimately result in Openreach terminating the service.

6. Appendices

The following tables are referenced in this SIN.

Fibre 1	Blue
Fibre 2	Orange
Fibre 3	Green
Fibre 4	Red
Fibre 5	Grey
Fibre 6	Yellow
Fibre 7	Brown
Fibre 8	Violet
Fibre 9	Black
Fibre 10	White
Fibre 11	Pink
Fibre 12	Turquoise

Table 4 Optical fibre identification (COF200 and COF950)

Tube	Identification / Colour
First tube	Red tube or the tube adjacent to red dummy tube
Last tube	Green tube or the tube adjacent to green dummy tube
Intermediate tubes	Uncoloured
Dummy tubes (not Marker/Reference tubes)	Yellow

Table 5 Loose tube element identification (COF200)

Element 1	Blue
Element 2	Orange
Element 3	Green
Element 4	Brown
Element 5	Grey
Element 6	White
Element 7	Red
Element 8	Black
Element 9	Yellow
Element 10	Violet
Element 11	Pink
Element12	Turquoise

Table 6 Loose tube element identification (COF950)

7. References

[1]	IEC 60825-1	Safety of laser products - Part 1: Equipment classification and requirements
[2]	CP1	Acceptance testing of installed optical cable for in-span interconnect between Openreach and Communication Providers
[3]	CP2	Requirements for optical cables at the point of connection between Openreach and Communication Providers
[4]	ITU-T G.657	ITU-T Characteristics of a single-mode optical fibre and cable
[5]	ITU-T G.652	ITU-T Characteristics of a single-mode optical fibre and cable

[6]	BS EN 50290-2-27	Communication cables. Common design rules and construction. Halogen free flame retardant thermoplastic sheathing compounds
[7]	BS EN 50575	Power, control and communication cables. Cables for general applications in construction works subject to reaction to fire requirements
[8]	ITU-T Rec. L.12	Optical fibre splices
[9]	ITU-T G.650.3	Test methods for installed single-mode optical fibre cable links
[10]	IEC and BS EN 61280-4-2	Fibre-optic communication subsystem test procedures - Single-mode attenuation and optical return loss measurement
[11]	BS EN 61300-3-35	Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements.
[12]	IEC/TR 62627-01	Fibre optic interconnecting devices and passive components. Fibre optic connector cleaning methods

8. Abbreviations

APC	Angled Polished Connector
CP	Communications Provider
COF	Cable Optical Fibre
IPR	Intellectual Property Rights
OTDR	Optical Time-Domain Reflectometer
SC	Standard Connector
SIN	Suppliers Information Note
PIA	Physical Infrastructure Access

9. History

Issue	Date	Changes
Issue 1.0	Jan 2021	First issue
Issue 1.1	Feb 2021	Amendment to Optical Safety paragraph to align with SIN525 (DFX)
Issue 1.2	May 2021	Amendment to accommodate new high fibre count options for the Internal & External variants

-END-