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All people involevd in the L2C activities of a Connectorised FTTP network

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FTTP Connectorised L2C Practices

Installation Instructions

About this document ...

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Issue 13	07-Aug-2020	Michael Rose	Inclusion of reusable drum
Issue 12	05-May-2020	Michael Rose	Update to staple type
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Issue 10	20-Feb-2020	Michael Rose	Document error corrected
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Issue 8	27-Oct-2017	Chief Engineers Office Technical Documentation team .	Sections 5.2, 4.2.1, 4.7 and 5.2 updated to include Commscope cable. All pictures re-numbered.
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Issue 3	02-Aug-2016	Chief Engineers Office Technical Documentation team .	Update to incorperate new pictures also update to incorperate new component for striping copper sheath
Issue 2	30-Jun-2016	Chief Engineers Office Technical Documentation team .	Update to incorperate new components
Issue 1	21-Jan-2016	Chief Engineers Office Technical Documentation Team .	New Document

Table of Content

1 Introduction

This document describes the Lead to Cash (L2C) practices for a Fibre to the Premises (FTTP) connectorised architecture. The document describes the installation of the connectorised drop cable in the underground and overhead network and details the termination of the drop cable into the multiport block and at the end customer premises.

2 Connectorised Network Overview

This section provides an overview of an FTTP connectorised network highlighting some of the differences between it and the BF FTTP architecture.

A pictorial comparison between the FTTP blown fibre and connectorised networks is shown in Figure 2-1. From the Aggregation Node (AGN to the ONT the network utilises solid cables and connectorised components instead of blown fibre, blown cable and BF manifolds. The current architecture also utilises a single 32 way split rather than the previous dual split and no longer uses a Fibre Distribution Point (FDP) between the splitter node and end user premises.

The connectorised network utilises a Connectorised Block Terminal (CBT) for distributing the final drop to the end user and serves the same purpose as the BF manifold in a BF network.

During the Plan & Build (P&B) stage, the CBT is installed on a pole top or in an underground structure. The block is factory terminated with a fibre tail which is installed into the splitter node (SPN) or aggregated in an intermediate joint. The fibres from the tail are also routed to the correct trays and spliced in the SPN or intermediate joint as part of the P&B activity.

The final drop to the end user is achieved through the installation of a pre connectorised fibre drop cable which replaces the drop tube and BF bundle used in the BF architecture.

Two practices exist for providing service from the CBT to the end user, the practice adopted will depend on the installation scenario.

In the majority of installations, at the end user premises the installation will require the installation of a Customer Service Point (CSP), a pre-connectorised indoor-outdoor cable to be routed from the CSP to the ONT and the connectorised drop cable run from the CBT to the CSP where it is spliced to the indoor outdoor cable.

If the above practice is not possible, for example where fitting the CSP would require splicing aloft the following practice is followed:

At the end user premises the drop cable is taken directly into the premises through an internal and external CLI without the use of an external CSP. The fibre from the drop cable is spliced to an indoor-outdoor cable in an internal CSP ideally positioned over the cable entry point. The indoor-outdoor cable is routed to and terminated into the ONT

Northern Ireland teams may use a spliced-on field fit connector in the customer premise, taking the 0.9mm flat drop fibre after stripping the sheath at the building entry point, to the ONT, where the connector is spliced on.

At the CBT the connectorised drop cable is then plugged into the block port to complete the installation.

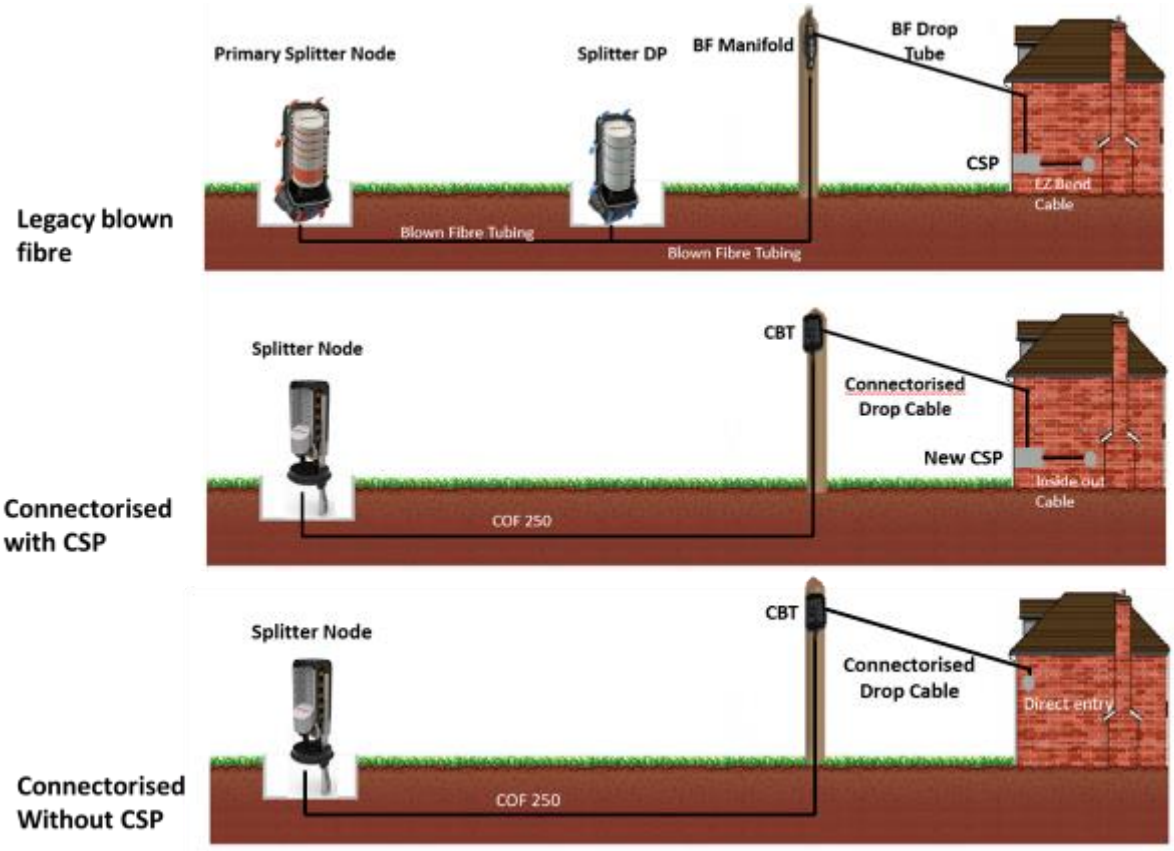


Figure 2-1 Blown Fibre / Connectorised Comparison

3 L2C Activities Overview

The objective of the L2C activities are to complete the FTTP installation from the CBT to the end user ONT and provide service. This involves completing the cabling in the premises, installing a CSP (FFC in NI) and running a drop cable from the CBT to the end user premises in the UG network or overhead.

There are some circumstances where the drop cable has been installed during build. If this is the case either the fibres from the drop cable will be stored in a CSP or the drop cable will be left at the end user capping with a 5m to 10m length coiled in the nearest joint box for installation.

3.1 Standard L2C Steps

The current standard FTTP L2C process (in GB) includes the installation of a CSP.

The CSP provides a demarcation between the internal and external cabling. The mounting of the CSP and the internal part of the installation should be completed first. This ensures that a repeat appointed visit is not required if for some reason it is not possible to install the drop cable from the CBT to the premises.

In Northern Ireland only, the direct entry method is used with a spliced field fit connector.

Figure 3-1 CSP

The steps involved in providing service to the end user are as follows:

- Agree ONT location with end user. Agree the cable entry point and ONT location, power up and activate the ONT – see section 4
- Route the fibre section from the ONT to the cable entry point agreed with the end user.
- For UG feeds replace the existing cover 101 or BT 66 with a CSP, refer to section 4
- Agree the cable entry point and ONT location, power up and activate the ONT
- Run the flat connectorised ROC/EZaxs drop cable (UG) from the CBT to end customer premises if this activity was not carried out at P&B, refer to section 5
- If the customers are fed jointly from a duct 100, an Y or X cable can be used in the duct to enable 2 or 4 fibres to serve more customers from the same duct. This is run from the CBT to the CSP. This is a SST type cable and can be self-rodded from the CBT if needed.
- Splice the fibre from the drop cable to the indoor-outdoor cable in the CSP, refer to section 4
- Authenticate hub and perform GEA FTTP service test.

3.2 Direct Entry L2C Steps

In some scenarios it will not be possible to install a CSP. An example of this is where the premises is located on an upper floor and the CSP would need to be mounted aloft where it would not be possible to splice.

Where a CSP cannot be installed (or in NI where field fit connector is being used) a ROC / EZ AXS from the CBT is taken direct to the premises. The fibre from the drop cable is then spliced in an internal CSP to the indoor outdoor cable with the outer sheathing removed which is then plugged into the ONT or in NI this may instead be a field fit connector spliced on the flat drop cable direct to the ONT. The steps for completing a direct entry installation are as follows: (for NI where a spliced field fit connector is used see section 4.4)

- Agree the cable entry point, ONT location and internal CSP location with the end user.
- power up and activate the ONT
- Install the internal CSP
- Install external part of the CLI
- Run the connectorised drop cable from the CBT to end customer premises and route to the cable entry
- If installing an OH Hybrid cable strip back the drop cable’s outer sheath at the end user premises, refer to section 6
- If installing a ROC or EZ AXS cable follow the guidance in section 4.4.1 for bringing the cable into the end user premises

- Pass the drop cable into the end user premises and route to the internal CSP
- Route an indoor-outdoor cable with the black sheathing removed from the internal CSP to the ONT
- Splice the drop cable fibre to the indoor-outdoor cable fibre
- Clean connector on the indoor-outdoor cable and power meter & take power reading.
- Connect into the ONT
- Authenticate hub and perform GEA FTTP service test.
- Connect the connectorised drop cable into CBT (Not required if carried out at P&B stage), refer to section 5

  To reduce the overall installation time, the ONT should be positioned close to the intended fitting location and the activation process started before starting the installation of the drop cable. Once initiated, the activation process can take 20 minutes to complete; any cabling installation can begin during the 20 minute activation sequence.

4 *Customer End Installation*

This section details the practices required for the customer end installation of both an external and internal CSP provision.

There are currently 2 options in GB when providing service to the end user

1. **External CSP installation:** This is the default installation process and should be adopted for all provisions where possible.
2. **Internal CSP:** In some scenarios it may not be possible to install an external CSP. For example, where the entry point for the cable is on an upper floor and there is no space or no permission granted to install an external CSP at ground level.

   In NI the service is provided with a field fit splice on connector rather than a CSP.

4.1 Safety

Warning:	Warning! Live lasers in fibre systems can cause serious injury!

See https://hr.bt.com/en-wish_3rdParty/safety-wellbeing/safety/health-safety-handbook/laser-systems-safety before commencing work.

Ensure all Openreach standard safety procedures are adhered to, including proper PPE equipment such as gloves, long sleeves and goggles and any other standard safety procedures that may depend on the individual task.
Please see the document ‘Cable jointing including the provision of blown fibre’ SFY/GRA/B002 and the associated risk assessment for likely hazards and

their mitigations, including the attachments that relate to these and instruct on control measures.

4.2 External CSP Installation

4.2.1 Internal Install

The steps involved in providing service to the end user for an external CSP installation are as follows:

- Agree ONT location and cable entry point with end user. Ensure two plug sockets are available and be mindful of the ONT obstructing furniture. If the drop cable is being installed overhead also agree the CSP location.
- Power up and activate the ONT
- Route the cable from the ONT to the cable entry point agreed with the end user.

Note: An internal and / or external Customer lead In (CLI) and long tube kit can be installed at the engineer's discretion depending on aesthetics and wall cavity thickness, See Figure 4-1 Inside-out Cable and CLI

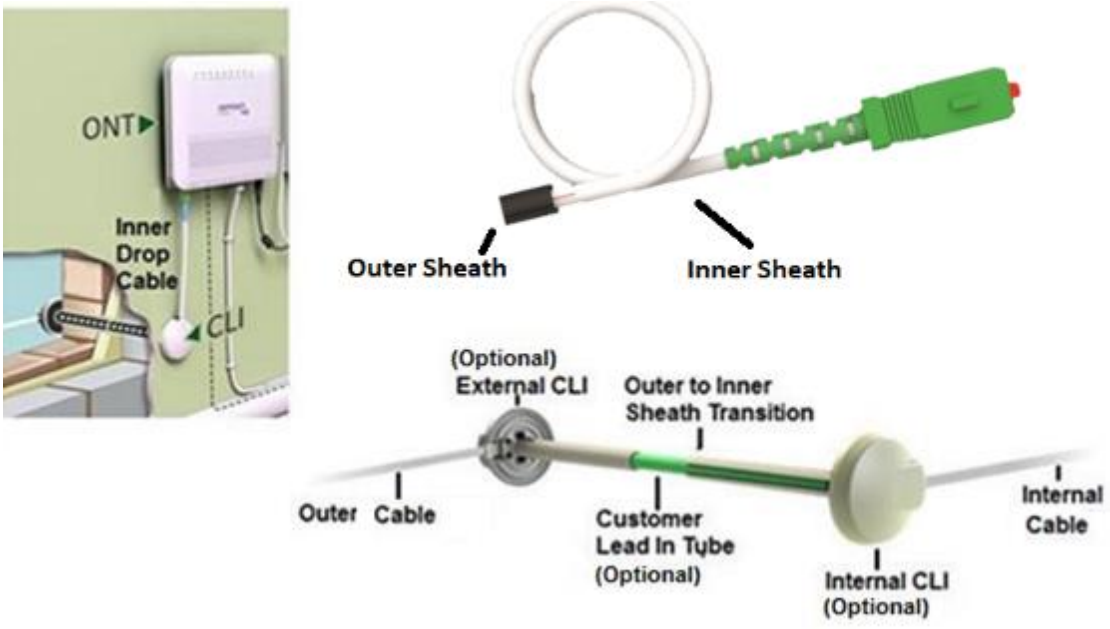


Figure 4-1 Inside-out Cable and CLI

- If an External Customer lead In Kit Item Code 061826 CLI is to be used it should be installed at the agreed cable entry point. Apply silicone sealant around the full circle of the CLI shoulder.

- Wrap a length of PVC tape around the cable sheath to mark a location where the cable will be positioned inside the wall / CLI as it passes from inside to outside the end customer premises. This position is indicated in Figure 4-1 Inside-out Cable and CLIas the outer to inner sheath transition.
- Wear gloves for protection and to avoid dermatitis from cable filler compounds.
- Use the rip cord (red in Figure 4-2 Inside-Out Cable) to strip the black sheathing back to the tape wrap marking.

Figure 4-2 Inside-Out Cable

- Pass the cable through the CLI (if fitted into the end user premises.) From outside of the end user premises pull through the remainder of the cable.

  Place a Customer lead In Kit Internal item code 061825 over the internal drop cable (if being fitted) and slide it along the cable to the wall entry point. The tube of the internal CLI fits inside the tube of the external CLI.

Note: If the cavity of the wall is very wide it may be necessary to insert a Customer Lead In Kit Long Tube item code 061827 between the external and internal CLI's, see Figure 4-1 Inside-out Cable and CLI

- Place the CLI caps onto the external and internal CLI's
- Retain the internal section of the cable with 3.5mm white cleats item code 044459. Alternatively, the cable can be retained using a Tacwise Z3 Tacker (**Set to Low Setting**) item code 083566 with CT45 staples item code 079617.

Warning: **If retaining the cable using staples ensure the staple gun is adjusted to the lowest setting and use only CT45 staples item code 079617.**

- Secure the external cable section to the end user premises using Cleat Wiring 4D Black item code 061022.
- For UG feeds replace the existing cover 101 or BT 66 with a CSP, see below
- Cut the external portion of the cable to allow for 2.05m of fibre to be installed into the CSP

4.2.2 CSP and CSP Cable Management

The external CSP is used for managing the fibres from internal cable and the external fibre drop cable. The external CSP is also able to accommodate the existing copper pair for many UG installations. Refer to the PDF instructions below for installing the CSP

For splicing instructions, follow the guide in ISIS document EPT/COF/D531

4.2.3 External CSP Installation

Video instructions on the installation of the CSP can be found Here.

Additional Notes:

Copper Installation – The screw holes should line up with the existing holes for the cover 101. See the PDF below for guidance on how to install the CSP. If the CSP is being fitted in a situation where the pre-existing copper goes into the customer premises directly without being crimped at the entry point and there is not room to fit the CSP directly over the entry point without crushing the cable, the CSP could be relocated higher up just past the copper entry point and the capping extended to cover the copper entry point.

ROC and EZ AXS – Cables are of a flat profile design which are constructed with 2 GRP strength members, one positioned either side of the fibre. Whilst this design has several benefits, it does result in the cable being less flexible. As a result, when running the cables around corners or when creating a drip loop, care must be taken to avoid over flexing the cable - which could result in the GRP strength members breaking. In order to avoid exceeding the minimum bend radius of these cables, the following process should be adopted.

Corning ROC and Commscope EZ AXS cleating guidance – Where possible avoid routing ROC or EZ AXS cables around the end user premises. Due to the use of GRP strength members these cables should be terminated as soon as possible in the external CSP, any cable routing should be carried out using the indoor outdoor cable.

Where it is necessary to route a ROC or EZ AXS cable use Cleat Wiring 4D Black item code 061022 when attaching to walls.

When routing around an outside corner it is necessary to double cleat the cables either side of the corner to avoid the cleats pulling away from the wall.

The first cleat should be positioned approximately 12cm after the corner and the second cleat positioned next to the first. Repeat this process for each side of the corner, see figure 4_3.

Figure 4_3. Cleating ROC & EZ AXS around corners

When routing around an inside corner it is necessary to double cleat the cable either side of the corner to avoid the cleats pulling away from the wall.

The first cleat should be positioned approximately 12cm after the corner and the second cleat positioned next to the first. Repeat this process for each side of the corner, see figure 4_4.

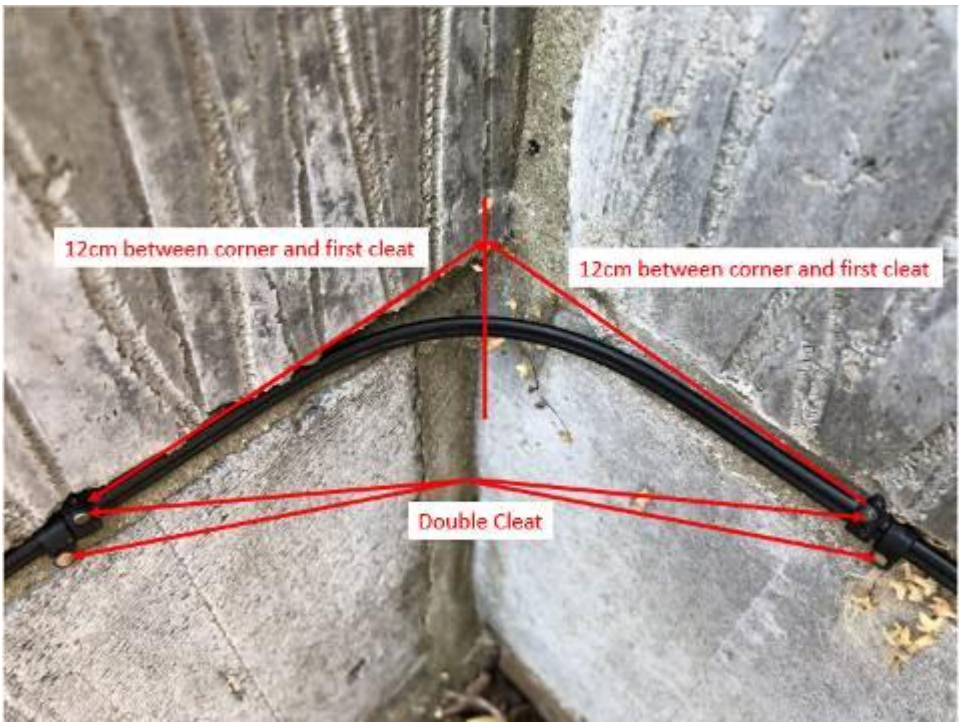


Fig 4_4 Cleating around inside corners

When transitioning from a horizontal to vertical or vertical to horizontal routing the cleats should be positioned 12cm from the transition point, see figure 4_5.

Double cleat to provide additional restraint.

Figure 4_5, cleat positioning for 90 degree direction change.

When creating a drip loop the cleats before and after the loop should have a spacing of 14cm between each other. Double cleats should be used, see figure 4_5.

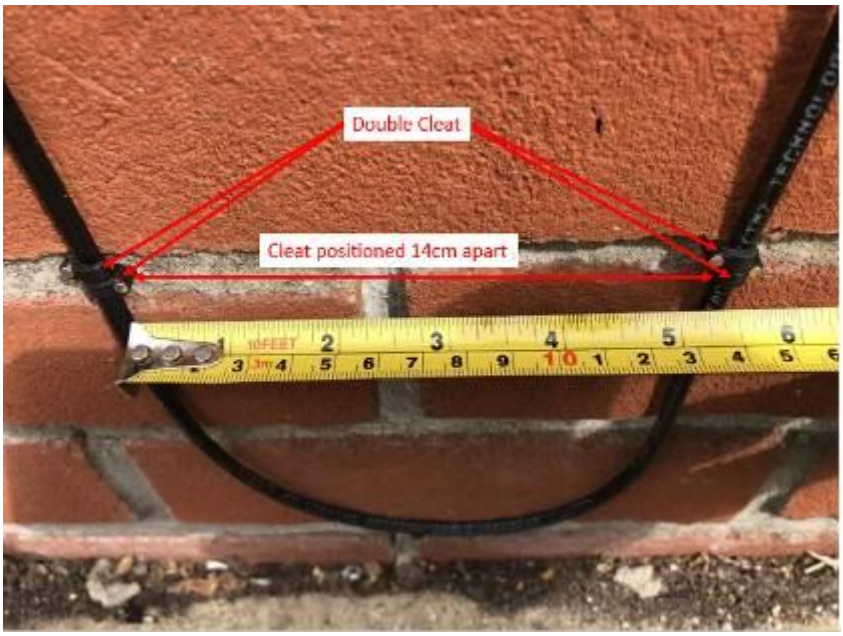


Figure 4_5, cleat spacing for drip loop

Hybrid Cable – Please note the hybrid is being phased out so this section is for reference only. Commscope's fibre cable that is to be brought into the inner slack management is 3mm rather than the Corning's 3.6mm but inside the CSP the fibre part is otherwise managed in the same way.

Newsites – If the Newsites cable needs to be replaced by an Openreach engineer, Dexgreen's inside-out cable can be used.

X & Y Cable – In some installs 'X' or 'Y' cables may have been used to provide service to the CSP. These are 4 or 2 fibre cables with two or four Optitap plugs on one end that are designed for fitting through tight duct 100.

RTRYVA Cable Installation – In some installs RTRYVA cable elements may have been used to provide service to the CSP. These contain 4 or 2 fibres in an element in a 6mm tube. The following PDF describes how these should be managed, spliced, and stored in the CSP.

2020_10_14-4-DEX-Openreach CSP_Sect

Armored Prysmian Cable Installation – In some installs armored cable may have been used to provide service to the CSP. The following PDF describes how these should be managed, spliced, and stored in the CSP.

2020_10_14-5-DEX_
CSP_FTTP Installatior

4.2.4 Reference CSP Information

The CSP has a variety of capabilities and flexibility. The PDFs below provide some additional information including cable clamping, blown fibre installation and Commscope round UG fibre cable.

2020_10_14-7-DEX-
Openreach CSP_FTTF

0.0. BT CSP_Cable
Strain Relief Orientat

2020-03-31-DEX-FO-
CSP-A5-Poster-2-We

2020_10_14-8-DEX-
Openreach CSP_FTTF

4.3 Completing the Customer Installation

Once the CSP installation is complete and the indoor-outdoor cable has been spliced to the connectorised drop cable the following steps should be followed to complete the installation.

- Fit the Capping 25 and Elephant's foot.
- Clean the connector and the power meter port using 2 clicks of a Fibre Optic Connector Cleaner SC item code 100205. – see AEI/AEC/B331 – 'Fibre Cleaning Process'
- Take a power reading from the end of the drop cable.
- Clean the port of the ONT and plug the connector into the ONT.
- Authenticate hub and perform GEA FTTP service test.

4.4 Internal CSP Installation

In a small number of scenarios, it may not be possible to install an external CSP. If an external CSP cannot be installed the drop cable must be taken into the end user premises and spliced to an indoor-outdoor cable in an internal CSP. In NI a spliced-on field-fit connector may be used.

The method for taking the drop cable into the premises depends on the type of drop cable being installed. For an OH Hybrid drop cable or a dual sheathed UG drop cable, follow the guidance in section 6 for preparing and taking the drop cables into the premises.

4.4.1 ROC and EZ AXS drop cable with Internal CSP Installation/ NI Field-Fit

This section details the practices for taking a ROC drop or EZ AXS cable into an end user premises and splicing in an OFS internal CSP (Or in NI for splicing on a field fit connector).

The steps involved in providing service to the end user for an internal CSP installation are as follows:

- Agree the ONT & internal CSP locations (For NI only ONT if a field fit is used). If possible, plan for the cable entry point to be behind the internal CSP location as this provides a neater and simpler installation. If it is not possible for the cable to enter behind the internal CSP agree the position with end user. Ensure two plug sockets are available and be mindful of the ONT obstructing furniture.
- Power up and activate the ONT
- (GB only) If the entry location is positioned behind the internal CSP offer up the CSP item code 061818. The Internal CSP item code will change to 106709 in the future
  Mark the cable entry point an the CSP fixing locations, see figure 4_7A
- Drill the 12mm cable entry hole in the positioned agreed with the end user.
- Fit an external Customer lead In Kit Item Code 061826 and either an Internal Lead in Kit (061825) or Thick Wall kit (061827) at the agreed cable entry point. Apply silicone sealant around the full circle of the CLI shoulder. See figure 4_6 A

Fig 4_6 ROC & EZ AXS entry

- Route the ROC or EZ AXS to the cable entry point following the cleating guidance provided in section 4.2.4.1.
- Feed a sufficient length of cable through the CLI into the property to reach the agreed internal CSP location. (For NI field-fit installation leave enough cable to reach the ONT and splice)
- At approximately 10cm from the edge of the CLI, double cleat the cable to the wall with a gradual bend, see figure 4_6 B. If the mortar is poor or the cleats do not feel as if they will hold, drill and use pin plug 1A (545509) to provide a more secure fixing for the cleats.
- Strap the cable to the CLI body using Straps Cable Fixing 1A (071814), see figure 4_6C. This will decrease the distance from the wall and prevent cable slippage.
- Place CLI cap into position and ensure it is fully seated, see figure 4_6D
- Manage the cable around any bend and drip loops using the double cleat method as described in section 4.2.4.1, see figure 4_6 E
- Cut the ROC or EZ AXS cable in the centre between the GRP strength members using a pair of side cutters. Once cut the two halves of the sheathing can be pulled apart all the way back to the cable entry point exposing the 0.9mm fibre. Note that the EZ AXS seam is not positioned centrally as is the case with ROC however, to strip EZ AXS the cut still needs to be made centrally at an angle and not against the seam.
- Trim away the protruding GRP strength members and sheathing flush with the wall see figure 4_7B
- For NI Field fit go to section 4.4.2 below
- Drill and plug the marked fixing holes then fit the internal CSP. Route 1m of the 0.9mm fibre into the module, see figure 4_7C.
- Measure the length of indoor-outdoor cable required for installation between the internal CSP and the ONT allowing for 1m of fibre in the CSP (GB only).

- Wearing gloves strip all the black outer sheathing from the indoor-outdoor cable.
- Strip 1m of 3mm white sheathing from the indoor-outdoor cable to expose the 0.9mm fibre. A short length of 3mm sheathing should be installed into the CSP, see figure 4_7D

Figure 4_7 installing fibre for behind CSP entry

- If it is not possible to position the cable entry point behind the CSP it will be necessary to route the 0.9mm fibre of the drop cable from the entry point to the CSP
- Place a Customer lead In Kit Internal item code 061825 over the wall entry point. The tube of the internal CLI fits inside the tube of the external CLI
- To route the 0.9mm fibre apply a very thin line of glue item code 094807 using the dispensing gun item code 094808, see figure 4_8
- Wearing thin gloves, press the 0.9mm fibre onto the thin bead of glue using a finger, see figure 4_9.
- Install 1m of 0.9mm fibre into the CSP, see figure 4_10 (GB)
- Place the CLI caps onto the external and internal CLI's

Figure 4_8 applying glue for 0.9mm fibre routing

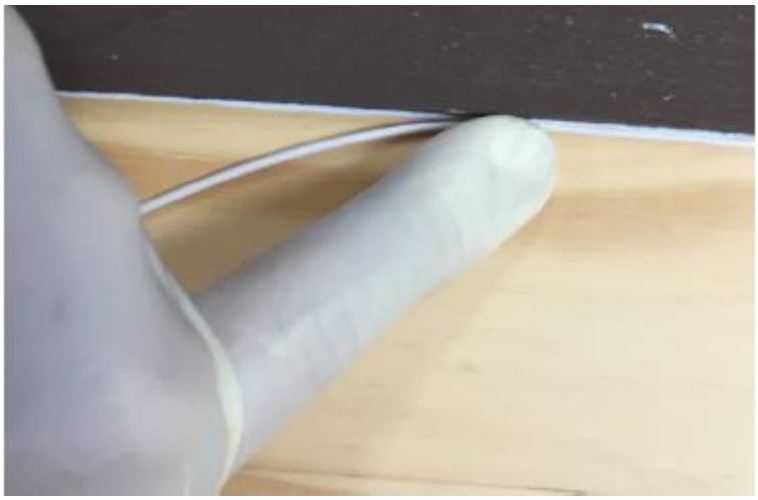


Figure 4_9 running 0.9mm fibre into bead of glue

Figure 4_10 fibre routed into CSP when behind entry is not possible.

- Wrap the full length 0.9mm fibre from both the drop cable and indoor-outdoor cable into the CSP and mark the fibre in the position indicated in figure 4_11A
- Remove the 0.9mm fibre from the CSP and strip the coating and the marks made in the previous step and prepare the fibres for splicing.
- Splice the fibres and wait for the protector splice 5A to fully cool down before installing the fibre and splice protector into the CSP, see figure 4_11B
- Fit the lid onto the CSP to complete the CSP installation.
- Retain the white section of the indoor-outdoor cable with 3.5mm white cleats item code 044459. Alternatively, the cable can be retained using a Tacwise Z3 Tacker (Set to Low Setting) item code 083566 with CT45 staples item code 079617.
- Continue with finishing section 4.4.3 below

4.4.2 Field-Fit Spliced-on Connector – NI ONLY

- The flat drop cable should be stripped to the 0.9mm coating at the premises entry point and glued up to the ONT location from the entry point .
- The 0.9mm fibre is routed and glued into position using the same glue and glue dispenser that is used in MDU's.
- Place a Customer lead In Kit Internal item code 061825 over the wall entry point. The tube of the internal CLI fits inside the tube of the external CLI
- To route the 0.9mm fibre apply a very thin line of glue item code 094807 using the dispensing gun item code 094808, see figure 4_8
- Wearing thin gloves, press the 0.9mm fibre onto the thin bead of glue using a finger, see figure 4_9.
- Place the CLI caps onto the external and internal CLI's
- Splice on the field-it connector, see attached PDF for field-fit instructions

Quick FIELD FIT Guide for BT.pdf

4.4.3 Finishing Install

- Clean the connector on the end of the indoor-outdoor cable (FFC for NI) and the power meter port using 2 clicks of a Fibre Optic Connector Cleaner SC item code 100205. – see AEI/AEC/B331 – 'Fibre Cleaning Process'
- Take a power reading from the end of the cable.
- Clean the port of the ONT and plug the connector into the ONT.
- Authenticate hub and perform GEA FTTP service test.

Figure 4_11 preparing and splicing the fibres

5 Installing the Drop Cable from the CBT to End User Premises

5.1 Safety

Warning:	Warning! Live lasers in fibre systems can cause serious injury!

See https://hr.bt.com/en-wish_3rdParty/safety-wellbeing/safety/health-safety-handbook/laser-systems-safety before commencing work.

Ensure all Openreach standard safety procedures are adhered to, including proper PPE equipment such as gloves, long sleeves and goggles and any other standard safety procedures that may depend on the individual task. Please see the document 'Cable jointing including the provision of blown fibre' SFY/GRA/B002 and the associated risk assessment for likely hazards and their mitigations, including the attachments that relate to these and instruct on control measures.

5.2 Installing Drop Cable Scenarios

There are 3 possible scenarios relating to the installation of the drop cable from the CBT location to the end user premises, 2 associated with UG installations and 1 for OH as follows:

- (UG) Single stage drop cable installation and provision. In most cases it will be necessary to install the drop cable from the CBT to the end user premises and provide service in a single visit either with a CSP or direct entry. Follow section 5.4
- (UG) Drop cable has been installed by P&B engineers from the CBT to end user capping or CSP, see section 4.2 for CSP and 5.5 for direct entry.
- OH installation which requires the installation of the drop cable/inside section and a service provision, either with a CSP or direct entry. See section 5.6.

5.3 Installing the Connectorised Drop Cable Overview

There are 4 types of connectorised drop cable used for the provision of brownfield FTTP. The type of cable installed will depend on the installation scenario. The 4 cable types are:-

- Flat drop cable
- Underground Dual Sheathed
- X & Y cables
- Overhead dual sheathed Hybrid

Flat Drop Cable

The flat drop cable is the standard single fibre connectorised drop cable used for the vast majority of installations, see section 5.4 for details on installing the cable from CBT to end user premises underground. The flat drop cable is supplied by Commscope (EZ AXS) and Corning (ROC).

For overhead installation see ISIS document Fibre Only Dropwire EPT/OHP/B080

X & Y Cables

Also available soon will be an X & Y cable. These are installed when a CSP is being fitted and the feed to the end user is underground via a duct 100. The X and Y cables contain 4 and 2 fibres respectively allowing up to 4 fibres to be installed in a single cable. These are ideal in scenarios where the small duct 100 is congested and would require expensive civils where it is not possible to install multiple cables. The indoor outdoor cables are then spliced to the fibres for the X and Y cables in the CSP and routed to each property to provide service.

The Y and X cables are COF 250 with a break out at one end terminated with 2 or 4 Optitap connectors which are plugged into the CBT. The COF 250 cable have two GRP strength members either side of a central tube which makes the cable quite stiff and capable of being self rodded. If installing a Y or X cable from the CBT to the premises, try to push the cable through the duct 100 directly to the premises rather than attempting to use a separate rod. If unsuccessful standard rodding and cabling methods will need to be employed, see section 5.4 for UG cable installation practices.

Dual Sheathed Connectorised Drop Cable

Please note this is being phased out

The underground dual sheathed cable is used in scenarios where the cable will be taken directly into the premises (CSP not being fitted) and the feed to the end user is underground.

The overhead dual sheathed hybrid cable is used for all overhead fed scenario’s, both when a CSP is being fitted and direct entry.

Both dual sheathed cables are supplied by two different manufacturers Corning and Commscope. In most instances the installation of these cables are identical however, there are some small differences that require different tools for stripping the cable sheathing. These differences will be highlighted throughout this document. The manufacturer of the cables is clearly marked on the labels supplied on the cable drum.

In the main, standard practices are employed for both UG and OH installations of the connectorised drop cables. However, since the cables are

supplied in set lengths, and because connectors are employed, some changes to standard practices are required.

5.3.1 End Stop

The connectorised drop cables are supplied in a range of lengths either on drums or in flat Pizza style boxes. The cables supplied on drums are suitable for use with the Dispenser Dropwire 2B Item Code 127548. The cables supplied in the pizza style box need to be manually mounted onto a reusable drum item code 105700, the reusable drum is also suitable for use with the Dropwire dispenser. See section 5.8 for details of how to install the flat packed cable onto the reusable dispenser.

Because the cables are of a set length and because they are terminated with a factory fitted ruggedized connector, (Optitap), the cable must be pulled exactly the correct distance during installation to allow sufficient slack at the pole top or underground structure to route the connector to and plug into the connectorised block port.

To ensure the cable is pulled the correct distance an end stop is fitted at the factory 1.5m from the Optitap connector at the end of the cable, see Figure 5-1. During installation the cable is passed through a pulley Dropwire 4 item code 127580 that is placed at the pole top or within the UG structure. The end stop is designed so that it cannot pass through the pulley 4, as the cable is pulled to the customer premises the end stop reaches the pulley and prevents the cable being pulled any further, See Figure 5-1 Drop Cable End Stop. This allows just the right length of cable for plugging into the CBT.

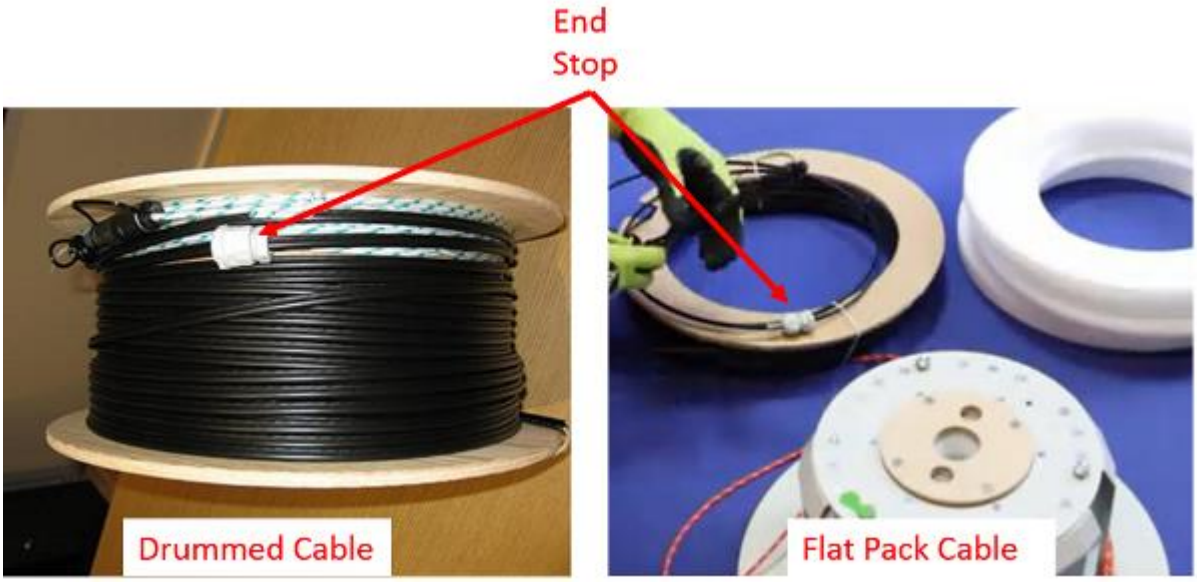


Figure 5-1 Drop Cable End Stop

5.3.2 Sash Line

During an overhead installation it is essential that the Dispenser Dropwire 2B operates as per standard practices. Because the drop cables are supplied in set lengths, a means of maintaining connection between the drum or reusable drum and the cable is necessary as the cable end leaves the drum during installation.

The connection is maintained by a sash line attached to the connectorised end of the cable on one end and to the drum on the other. The drummed version of the cable is supplied with the sash line pre attached to the connector and drum, in the case of the reusable drum the sash line is pre attached to the drum but is attached to the connector by the engineer in the field.

During installation, as the cable end is pulled past the drum, the sash line maintains connection and ensures the dispenser breaking mechanism is able to apply the correct tension throughout the operation, see Figure 5-2

Figure 5-2 End Stop & Sash Line

5.4 Installing the Drop Cable from the CBT to End User Premises (Single Stage) UG

In most cases the L2C activity will require the installation of the drop cable and the provision of service in a single visit. The drop cable should be installed from the CBT to the end user premises as follows:

- Rod and rope the duct between the CBT and end customer premises using standard attachments and hand cabling practices detailed in ISIS documents EPT/UGP/E044 & EPT/UGP/E046
- The duct drill attachment may be helpful in clearing blockages. A powerful drill on hammer drill mode is more effective for this. See here

  If it is not possible to rod and rope the duct due to duct congestion or a blockage the job must be referred back for a duct clearance.
- If you are installing the drop cable from a reusable drum refer to section 5.8 for details of how to load the flat pack cable onto the drum.
- Mount the drop cable drum into a Dispenser Dropwire 2B and place the dispenser at the end of the joint box opposite the duct through which the cable is to be installed.
  Ensure the dispenser is stabilised by the use of sand bags or by attaching it to the box guarding.

  A Pulley Dropwire 4 is required for a UG installation so that the end stop can be used to help ensure the cable is pulled in the correct distance as described in section 4.2. Pass the free end of the drop cable through a Pulley Dropwire

4 and attach the pulley to a cable support bearer or step in the UG structure, see Figure 5-3

Figure 5-3

- Secure the drop cable into a pulling sock grip item code 046077 using standard fitments and attachments detailed in EPT/UGP/E044, attach the stocking grip to the cabling rod, see Figure 5-4

Figure 5-4

- Install the drop cable in the underground duct network from the CBT to the end user premises using standard hand cabling practices as detailed in ISIS EPT/UGP/E046. The maximum pulling tension of the cable is 1.5 kN or hand tension. Continue to pull the cable until the end stop reaches the pulley no 4.

A resistance will be felt as a result of the end stop being unable to pass through the pulley

- Follow the practices detailed in section 5.8 for terminating the drop cable into the CBT and section 4 for installation at the end user premises.

5.5 Pulling the Drop Cable following P&B Installation UG

In some scenario's the drop cable may have been installed from the CBT to the end user premises capping at the P&B stage. In these instances, a coil of drop cable will have been left by the P&B team in the joint box at the CBT location of sufficient length for routing to the ONT location.

To complete the installation the following steps should be followed:

- Enter the joint box where the CBT is located and cut the cable ties used to retain the drop cable coil.
- At the end user premises remove the capping to gain access to the drop cable and pull the slack from the joint box to the premises.

Follow the practices detailed in section 5 for terminating the drop cable into the CBT and section 6 for installation at the end user premises.

If the cable and a CSP were installed during build, the fibre from the drop cable will be stored within the CSP. If this is the case refer to section 4.2.1 To complete the installation.

5.6 Overhead Flat Drop (ROC/EZ-AXS) Fibre Only Cable Installation

The instructions for this can be found in a separate ISIS document Fibre Only Dropwire EPT/OHP/B080

5.7 Overhead Hybrid Drop Cable Installation (Being phased out)

This cable is in the process of being phased out and replaced with fibre only cable. This section will be for reference only at the end of this process.

For the instructions see the attached.

HYBRID c004 subsection (2).pdf

5.8 Terminating the Drop Cable into the CBT

This section details the practices required for completing the termination of the connectorised drop cable into the CBT for both the OH and UG installations**.**

Note: **During the process of terminating the connectorised drop cable into the CBT it is important to minimise the length of time the ports or connectors are exposed with dust caps removed. This is to help prevent the possibility of the ports or connectors becoming contaminated.**

- Identify the correct block port according to the routing information provided in the job pack. See Figure 5-5 for port identification.
- Remove the dust caps from both the CBT port and drop cable connector. Align the arrow on the connector body with the notch on the port, and insert the connectorised drop cable into the block port, see Figure 5-6
- Screw the threaded shroud of the connector onto the thread of the port
- Screw the protective caps of the connector and the port together, see Figure 5-7
- If at any time it is suspected that either the port of the CBT or drop cable connector has been contaminated it is essential they are cleaned using a Fibre Optic Connector Cleaner SC item code 100205. Clean the connector using 2 clicks of the connector cleaner.

Warning: If at any time it is suspected that either the port of the CBT or drop cable connector has been contaminated it is essential they are cleaned using a Fibre Optic Connector Cleaner SC item 100205.

Figure 5-5 Port Numbering

Figure 5-6 Aligning Drop Cable Connector with Block Port

Figure 5-7 Joining Protective Caps

5.8.1 Flat Fibre-Only Drop Cable Management On A Pole

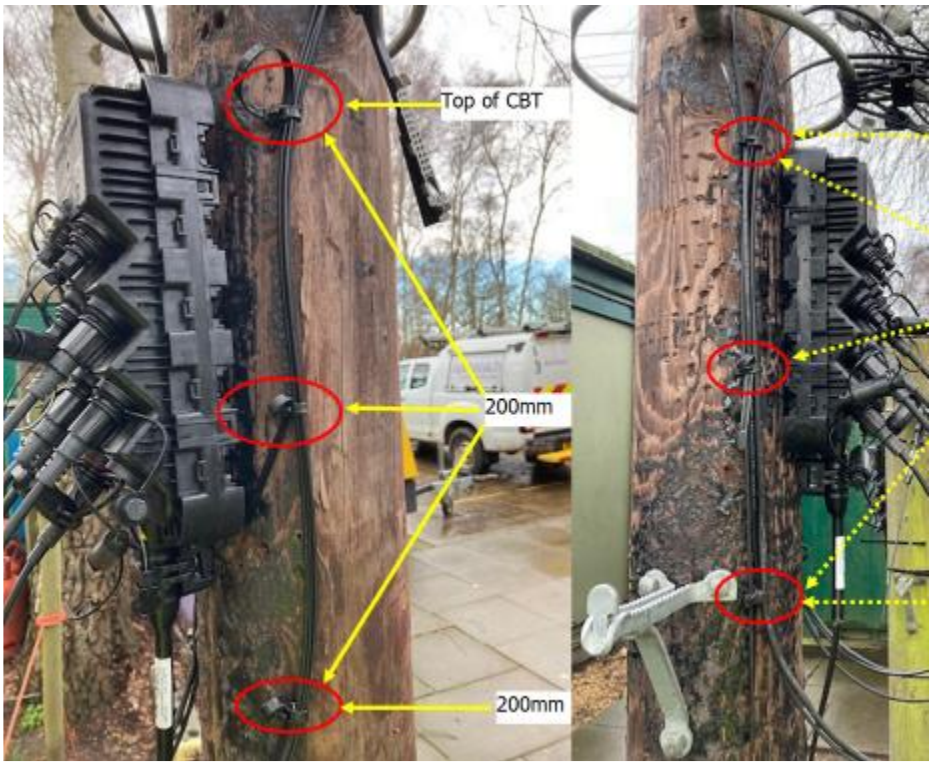
It is important to manage the cable properly on the pole and ensure cables are not free to flap in the wind or hamper the engineer working on the pole.

To do this, fix Strap Cable Fixing 12A at points shown in Figures 5_35, 5_36 and 5_37 for the respective fixings.

Where there is more than one cable the cables should be strapped together with Velcro- item code 050714

Figure 8

Figure 5_36



In this situation, the first SCF should be installed at the top of the CBT. Measure 200mm, then fit 2nd SCF. Measure 200mm to the 3rd SCF. Do same on other side of CBT.

5.9 Mounting Flat Pack Cable onto Reusable Drum

To maximise the space in vans Openreach is introducing drop cables that are supplied in flat pizza style boxes rather than on drums. The flat pack cables need to be mounted onto a reusable drum, item code 105700 in order to install the cable from the CBT to the end user premises.

This section details the process from mounting the cables onto the reusable drum. Once the cable is mounted onto the drum the practices detailed in section 5.4 should be followed for drop cable installation.

An excellent video for mounting the cable onto the reusable drum can be see here: Mounting drop Cables onto a Resuable Drum

The reusable drum is supplied with foam packing rings and a sash line for attaching to the end of the drop cable, see figure 5-35.

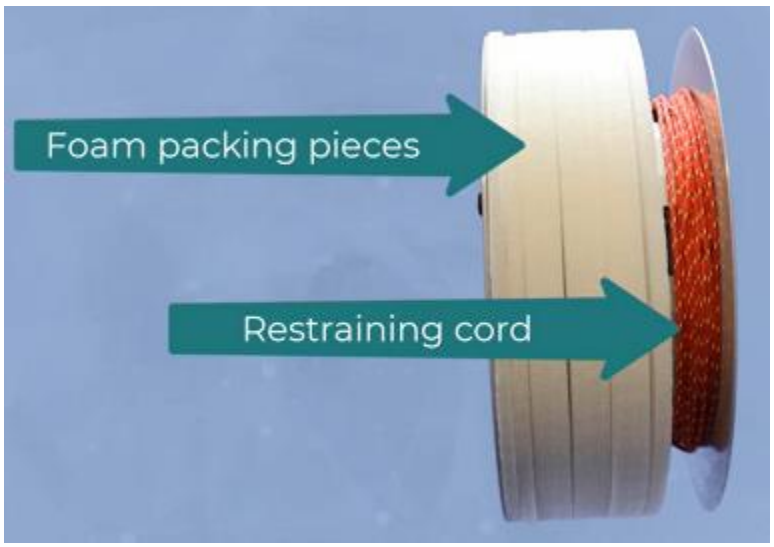


Figure 5_35

On oneside of the drum is positioned an indexing pin, alignment indicator, drum lock holes and a friction plate. See figure 5_36

Figure 5_36

On the other side of the drum is positioned the cable paypayout indicator, restraining cord tie off and bottom friction plate, see figure 5_37

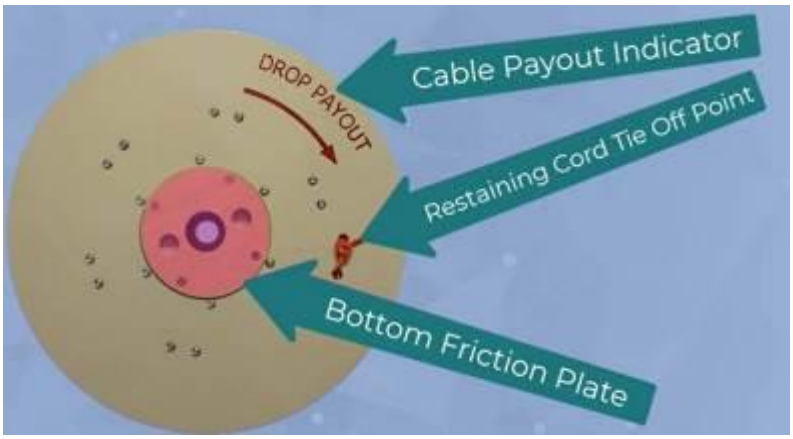


Figure 5_37

Before using the reusable drum check the friction plates and the other key components highlighted above of wear and correct operation.

- To load the cable place the drum flat on the floor. Lift the indexing pin and rotate the side flange plate anticlockwise, see figure 5_38

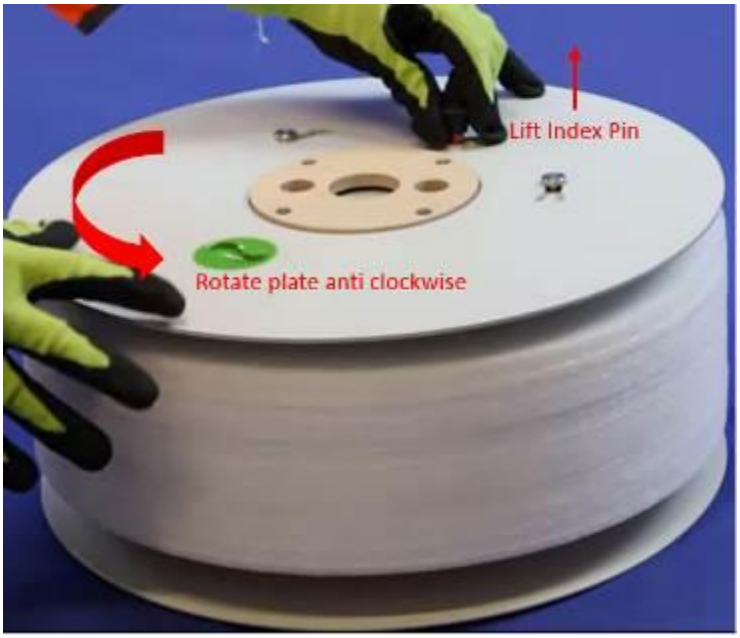


Figure 5_38 unlocking side plate flange

- Once unlocked lift the side place off the drum and place to the side
- Remove the foam packing rings from the drum, see figure 5_39

Figure 5_39 Removing plate and foam rings

- Unwind the sash line one complete turn allowing enough length to tie onto the connector on the drop cable, see figure 5_40.

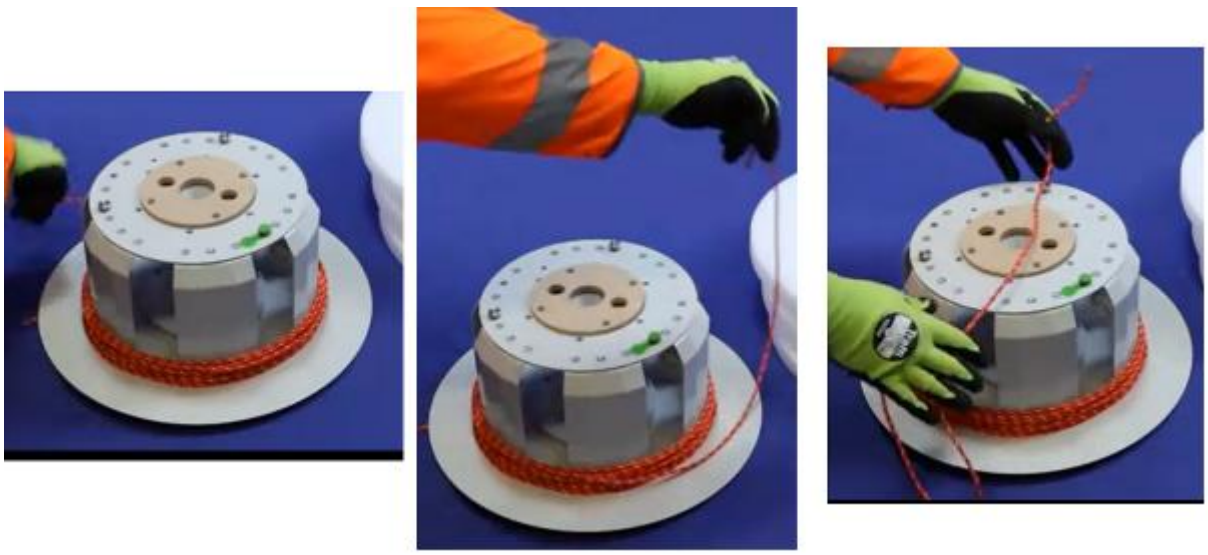


Figure 5_40 unwinding sashline one turn

- Select the correct length of cable required for the installation and place it on the ground with the Optitap connector and cardboard facing upwards, see figure 5_41

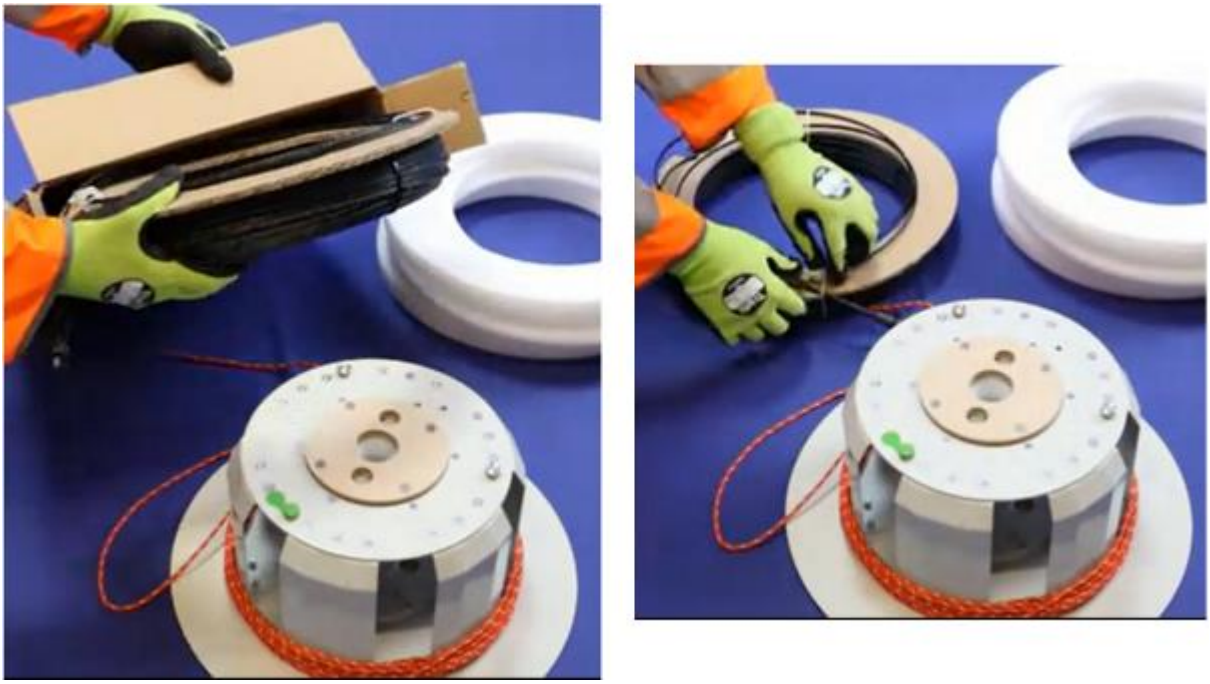


Figure 5_41 Preparing drop cable for attching sash line

- Pass the end of the sash line on the drum through the eye on the end of the drop cable Optitap connector. Tie the sash line off using a double sheet bend knot, see figure 5_42

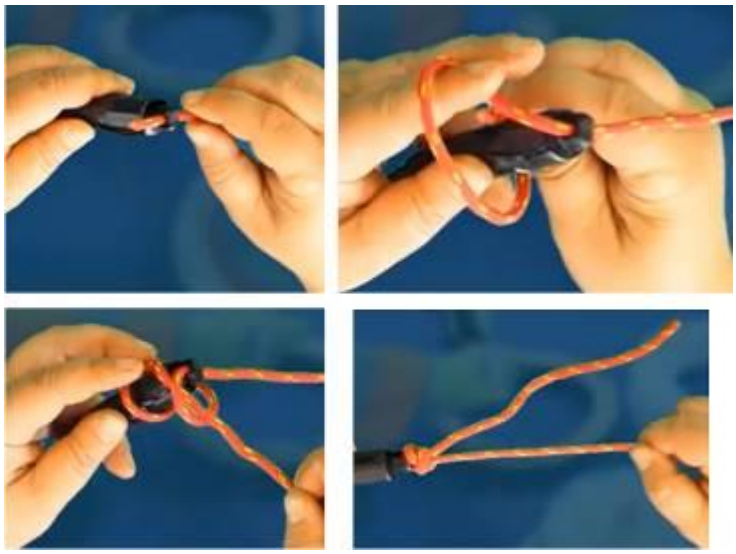


Figure 5_42 tying sash line to drop cable

- Wind the excess sash line back onto the drum, see figure 5_43

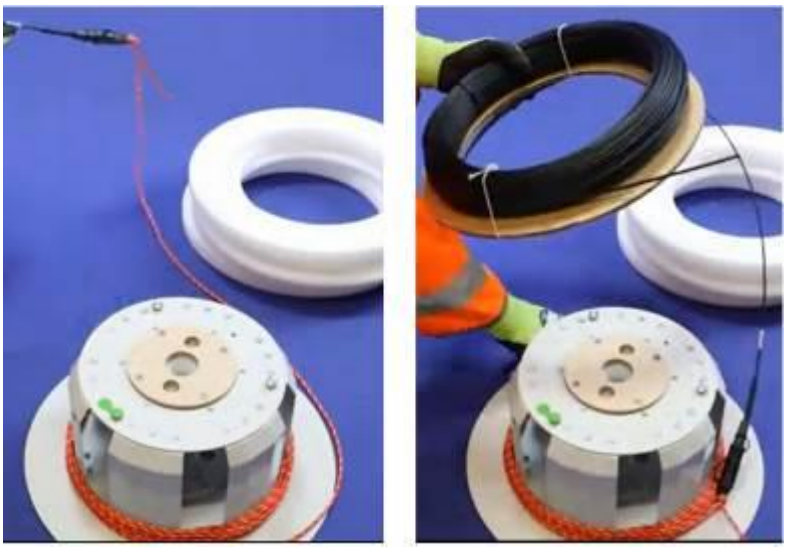


Figure 5_43, wind excess sash line slack

- Place the drop cable onto the drum with the cardboard facing down. Wind the cable to remove any cable slack, see figure 5_44

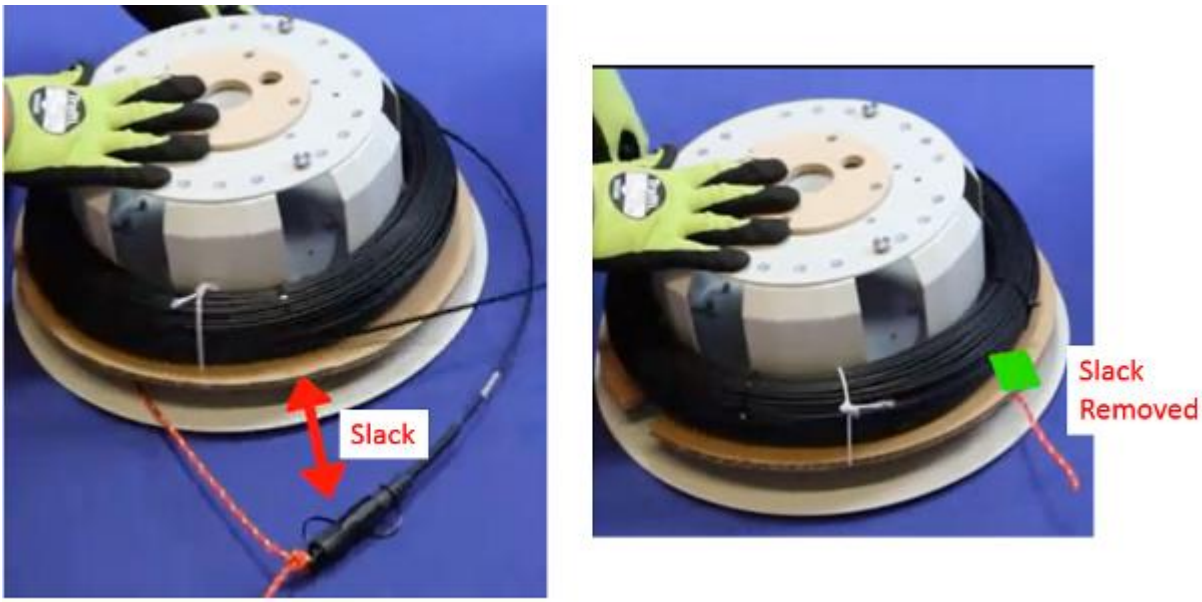


Figure 5_44, removing cable slack

- Press the cable down to make sure it is in its lowest position. Place enough foam packing rings on top of the cable so that the top ring is level with the top of the drum, see figure 5_45

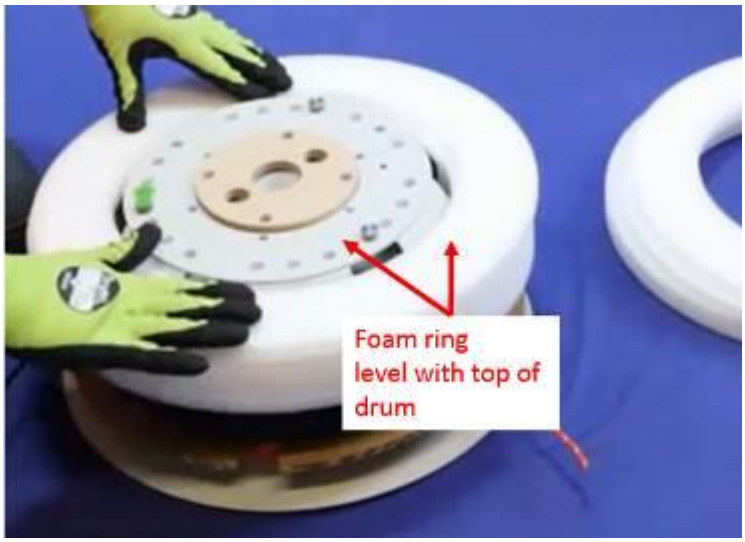


Figure 5_45, installing packing rings

- Place the side plate back onto the drum making sure to align the green markers on the plate with the green marker on the drum. Press down on the plate and rotate it clockwise until it locks into position. When locked in place the indexing pin will click down into position, see figure 5_46

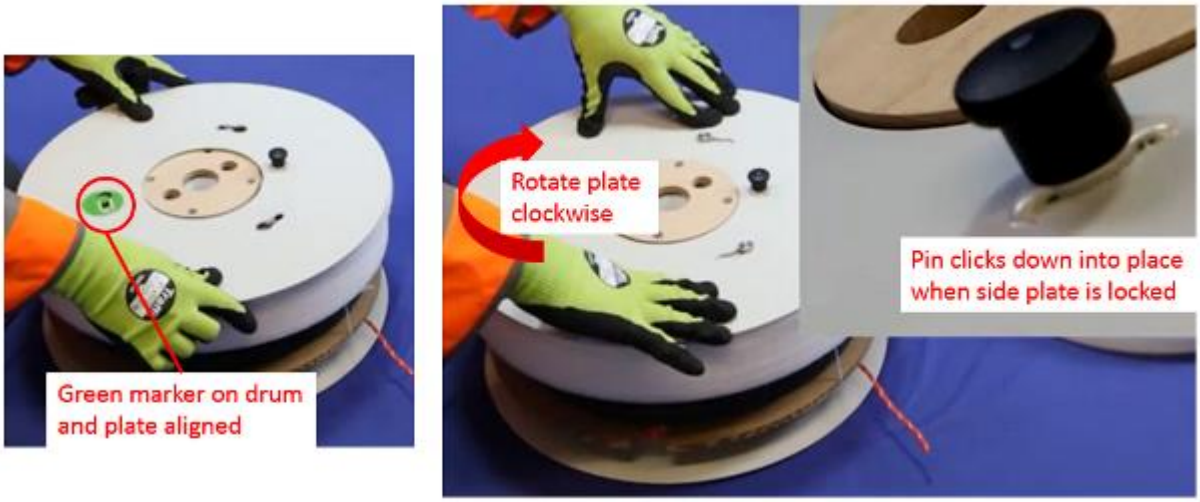
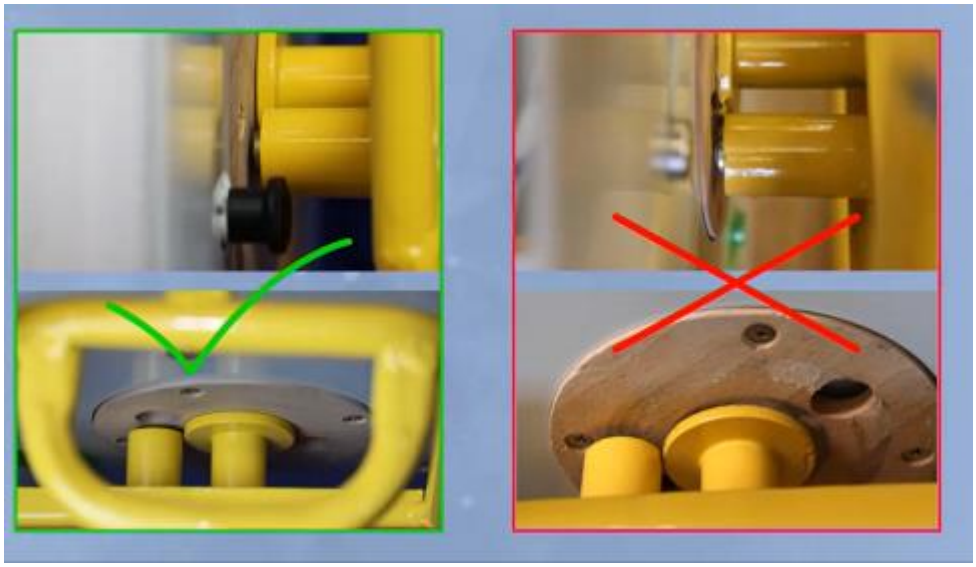


Figure 5_46 attach side plate to drum

- Make sure the plate is locked by inspecting the index pin, when in the locked down position the red open marker will not be visible
- Load the reusable drum onto the Dropwire dispensor using the same process as when loading a wooden reel.
- Make sure the payout arrow indicator on the drum and the dispensor are pointing in the same direction, see figure 5_47

Figure 5_47 payout arrows align

- With the locking pin in the open position rotate the drum two full revolutions to make sure the pin does not obstruct the drum lock off holes.
- If the friction plate is starting to snag on the locking pin or there are visual signs of wear the friction plate should be replaced, see figure 5_48



5_49 inspecting friction plate

- Once the cable is loaded carefully cut away the cable binders, see figure 5_50

Fidure 5_50 remove cable binders

- Follow the guidance in section 5.4 for installing the drop cable from the CBT to the end user premises
- Once the cable has been dispensed the sash line must be wound back onto the drum. Loosen the break on the dispenser and back off the tension. Rotate the drum whilst holding the sash line towards one side of the drum, see figure 5_51

Figure 5_51 winding sashline back onto the drum

5.9.1 Replacing the sashline

- Inspect the end of the sashline to make sure it is not frayed or damaged, if damage or fraying is visible the sashline should be replaced.
- To replace the sashline attach it to the sashline tie off holes using a reef knot tied on the outside of the drum, see figure 5_52

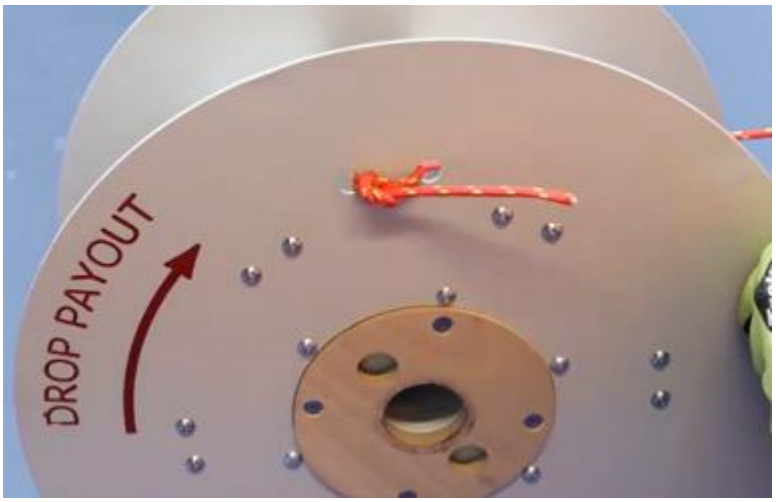


Figure 5_52, sashline tied off with reef knot

- Wind the new sashline onto the drum in an anticlockwise direction, see figure 5_53

Figure 5_53 winding new sashline onto drum

5.9.2 Replacing the friction plates

- Inspect the friction plate for wear. If excessive wear is visible or if the locking holes snag on the locking pin when the pin is in the out position the friction plate should be replaced.
- To replace the friction plate unscrew the four retaining screws, see figure 5_54 and lift the plate away from the drum.

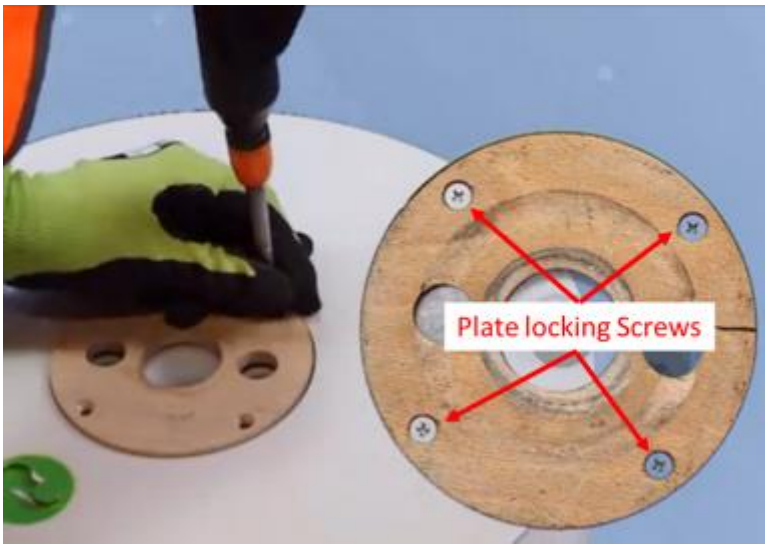


Figure 5_54, removing worn friction plate

- Place a replacement friction onto the drum making sure to align the locking holes of the friction plate with the locking holes of the drum, see figure 5_55. Re attach with the four securing screws.

Figure 5_55, aligning replacement friction plate.

A list of item codes for the flat packed cables, reusable drum and associated accessories can be seen in figure 5_56.

Item	Item Code
Reusable Drum for FTTP drop cables (Full Drum Kit)	105700
Reusable Drum Side Flange	105696
Reusable Drum Wood Friction Plates	105697
Reusable Drum Foam Separators	105698
Reusable Drum Sash Cord	105699
Cable Items	**Item Code**
FTTP UG CONN ROC DROP 35M (BOX)	100997
FTTP UG CONN ROC DROP 65M (BOX)	100999
FTTP UG CONN ROC DROP 105M (BOX)	101000
FTTP UG CONN ROC DROP 160M (BOX)	101001
FTTP UG CONN ROC DROP 350M DRM	100626 (current)

Figure 5_56, reusable drum item codes

6 *Installing OH Hybrid & Dual Sheathed into the Customer End Direct Entry*

Please note the hybrid cable is in the process of being phased out.

IMPORTANT NOTE – Commencing 21/06/2021, this cable is no longer CPR fire regulation compliant. Therefore, this cable must be terminated at the CSP. In the instance where the cable has to enter the customer premise, it must not exceed 2m inside. If the cable has to be taken more than 2m inside the premise, the cable must be transitioned to the inside-out cable via an internal CSP.

The following will be for reference only. Please see attached and ensure that the above **IMPORTANT NOTE** is followed.

C004 hybrid direct entry section.pdf

7 Stores

Table 1 Stores Items

Item Description	Item / Supplier Code
Above Ground Drop Wire Closure	038271
Cable Stripper Small Diameter	061520
Clean Click 2.5mm Tool	100205
Cleanwipe Optical Grade Wipe	100204
Cleat White 6mm	061020
Cleat Wiring 4d Black	061022
Cleat Wiring Hybrid Cable	080809
Cleat 3.5 Mm Black (For Copper Pair Of Hybrid)	078454
Cleat 3.5 Mm White (For Copper Pair Of Hybrid)	044459
Cleaver Optical Fibre 3g	046781
Customer Lead In Kit External	061826
Customer Lead In Kit Internal	061825
Customer Lead In Kit Long Tube	061827
Dispenser Dropwire 2b	127548
FTTP OH Connector Drop 33m.	97509
FTTP OH Connector Drop 55m.	97510
FTTP OH Connector Drop 105m.	97511
FTTP OH Connector Drop 160m.	87423
Fdc Ug Cabling Stocking Grip	046077
Fibre Splice And Connector Cleaner	100203
Fttp Bfd/Cu Hybrid Come Along Grip	069586
Fttp Oh Connector Drop Stripping Tool For Copper Section Of Commscope Cable	092844

Fttp OH Connectorised Cable 350m	097512
FTTP UG Connector Drop 33m.	097513
FTTP UG Connector Drop 65m.	097514
FTTP UG Connector Drop 105m.	087426
FTTP UG Connector Drop 160m.	087427
FTTP UG Connector Drop 350m.	097515
Gun Mastic Heavy Duty 350ml	058200
Kevlar Scissors	080470
Nipper Diagonal Cutting 5 Inch	122360
Ont Standalone	092345
Optitap 15m Test Lead SC/APC Connection	093683
Optitap 3m Test Lead SC/APC Connection	093681
Optitap Patch Lead Optitap Apc To Sc Upc	088329
Pen Marker 1	129408
Plastic Coating Hybrid Drop Wire Clamp (Fibre Section Only)	088734
OH Connectorised Hybrid Drop Cable Clamp - Bag Of 10	104340
Plastic Coating Hybrid Drop Wire Clamp (For Wrapping The Whole Cable)	090259
Power Meter Optical 3c	026457
Pulley Dropwire 4	127580
Pulley Dropwire 6	047036
Sealant Silicone (Clear)	127865
Sharps Disposal Kit	129418
Spanner Adjustable 150mm	126846
Staple Cable 10mm White	079617
Straps Cable Fixing 12A	072586
Stripper Fibre 10a	127224
Stripper Fibre 1a	126826

Tacwise Z3 Tacker	083566
Tool Bag (Overhead)	129434
Visible Light Source	093689
Velcro	050714
Yellow Tape	072980
Inside Out Specific	
Underground Drop Cable 35m (On drum)	100621
Underground Drop Cable 55m (On drum)	100622
Underground Drop Cable 65m (On drum)	100623
Underground Drop Cable 105m (On drum)	100624
Underground Drop Cable 160m (On drum)	100625
FTTP UG Conn ROC Drop 35 (In Box) for use with reusable drum	100997
FTTP UG Conn ROC Drop 65 (In Box) for use with reusable drum	100999
FTTP UG Conn ROC Drop 105 (In Box) for use with reusable drum	101000
FTTP UG Conn ROC Drop 160 (In Box) for use with reusable drum	101001
2.9mm Inner 5mm Outer. Rip Cord – 5m	100627
2.9mm Inner 5mm Outer. Rip Cord – 10m	100628
2.9mm Inner 5mm Outer. Rip Cord –20m	100629
2.9mm Inner 5mm Outer. Rip Cord – 30m	100630
2.9mm Inner 5mm Outer. Rip Cord – 50m	100631
1.25mm Cleaning Buds	010094
Lint Free Cleaning Buds	105488
Demarcation Box (Csp) - Grey	100632
Capping 25	72180
Connector Bend 4	95096
Internal CSP Dexgreen	108349
Paint Brush	112320

Protector Splice 5a	076071

Reusable Drum Specific

Reusable drum (for use with boxed drop cables)	105700
Reusable drum side flange	105696
Reusable drum wood friction plates	105697
Reusable drum foam seperators	105698
Reusable drum sash cord	105699

END OF DOCUMENT