Installation procedure of Pullback Cable

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Abstract
The Sterlite Pullback Cable is designed to provide installers with mechanisms to reduce fibre installation times, including a reduction to the amount of trenching, reduced levels of splicing and ease of handling. The benefits that the cable design offers are most apparent when used in Fibre to the Home (FTTH) network. The only difference to a conventional point to point (P2P) and point to multipoint (P2MP) installation is there will be a staged fibre breakout. This cable is ideal for installation in existing ducts or right of way scenarios (tunnels, subways, sewers, etc.).

Due to the similarities, this document concentrates on a P2P installation, emphasizing the cable and the installation processes used to optimize the benefits that the cable provides. This application note provides the product concept, installation & maintenance methods of Pullback Cable fibre optic cable.

Keywords
Pull Back Cable, FTTH, P2P, P2MP, POP
1 Introduction -
A high crush, polyethylene sheath is provided to protect individual fibre units. The sheath accommodates two diametrically opposed glass fibre reinforced plastic (FRP) strength members to reduce torsion and to aid with cable pulling. Fibres are provided within thermoplastic tubes to aid fibre manipulation. The cables are provided with either 12 or 24 thermoplastic tubes, offering fibre counts of 24, 48 or 96 fibres.

These are constructed with color coded fibres placed in a thermoplastic tube/module, protected by two embedded strength members for anti-buckling property and are covered with outer sheath which makes the cable robust and installation friendly. Whilst it is possible to provide a single dwelling with anything from one to four fibres, the number of fibres will determine the number of times that a thermoplastic tube will be divided into individual fibres, which introduces additional splice enclosures. This document assumes that all the fibres within a Thermoplastic tubes are intended for a single dwelling.

Figure 1 Typical FTTH Backbone using Sterlite Pull Back Cable

2 Overview
The Sterlite Pull Back Cable is designed for use in fibre to the home (FTTH) applications. Whilst the cable may be installed into duct systems, the high crush cable sheath also allows for direct burial into reduced depth trenches, as shallow as 30cm. The individual Thermoplastic Tubes can be extracted from the sheath to provide fibres directly to each home without the need for additional fibre connections. Thermoplastic Tubes are designed to be retracted from the sheath for lengths as great as 100 mtrs and can then be pushed into alternative micro-ducts for distances up to 30 mtrs. This manipulation of the fibre units reduces the number sheath cuts, limiting them to convenient access areas and allows the fibre to be presented straight to the home access point.
Figure 1 is an example of a backbone installation using the Sterlite pull back cable. The cable is laid along the length of the FTTH network, passing dwellings suitable for connection. This 'homes passed' technique allows the installer to create a fibre ready environment without the additional cost of providing fibre to each individual home before the occupier is ready to sign up to the service. An alternative is to lay the cable in a ring format to allow for fibre connection from either end, or alternatively for redundancy cabling to protect against single cable failure.

Conventional loose tube cable is provided from the point of presence (POP) to the distribution node or first joint enclosure, where it is spliced to the FTTH pull back cables, enabling their activation.

3 Features & Benefits:
- Available upto 96 fibre count in either single-mode or multi-mode optical fibres.
- Special low-bend-sensitivity fibre provides high bandwidth and excellent communication transmission property.
- Two parallel strength members ensure good performance of crush resistance to protect the fibre.
- Simple structure, light weight and high practicability.
- UV protected.
- Tightly controlled physical parameters.
- Thermoplastic tubes are kink resistant and easily removed with conventional tools.
- Fast and easy midspan access.
- Ultra-compactness, easier storage and faster installation.
- Longitudinal moisture protection is enabled by water blocking compounds in tube and core.

4 Installation Methods

4.1 Laying by Trenching or Direct Burial methods

Whilst pull back cable is suitable for installation into ducts, its construction allows for direct burial. The robust sheath provides a ducted environment for the fibre units and brings the additional advantage of reduced depth trenching. Trenching is considered one of the most expensive procedures when laying cables and so reducing installation depths to as little as 30cm can significantly reduce both the time and expense associated with this activity, whilst also removing the need to implement duct systems in areas where they are not deemed as necessary. Figures 2 and 3 below define a typical FTTH installation in Netherlands, where the conventional trenching depth is halved.
Abstract
The “dry” cable design compares favorably with a “wet” design that uses a flooding compound in the voids within the cable core and/or a thixotropic gel within the buffer tubes to achieve comparable water blocking performance.

Keywords
Dry cable, super absorbent powder, fiber buffer tubes, cable weight, environment friendly, cost savings

A Comparison of Dry Versus Gel Filled Optical Cables

4.2 Open/Window cut on the sheath
Place a wrap of tape around the cable sheath at the specified distance from the end of the cable corresponding to the sheath length to be removed to make a window cut of approx. 10cms by using cutting tool. Whenever mid-spanning /access of Thermoplastic tubes of Pullback Cable is required, window cut on the cable is made by using ACS sheath cutter). Carefully make window cut on the cable conduit jacket. This cut should not penetrate the cable core. Care should be taken not to damage the cable core while cutting through the cable sheath. Follow the same procedure as described above, make window cut on the cable jacket approximately 100 meter away from the 1st window cut end, unless otherwise specified.
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Figure 4 Selection of location to begin end of sheath removal.

Figure 5 Window cut cable jacket using ACS cutting tool

Figure 6 Window cut cable jacket
4.3 Cut and pull the Thermoplastic tubes

To extract a Thermoplastic tubes from the pullback cable, two invasive, window cuts are made into the cables sheath as per figure 7 above. The first cut is located adjacent to the property to which the fibres are intended and the second cut is located by the next property to be serviced; this reduces the number of sheath invasions. At the second location, the Thermoplastic tubes itself is also cut and the Thermoplastic Tubes length is then pulled back through the sheath to the first cut location. It is possible to pullback the Thermoplastic tubes as much as 100 metres.

Note: Two diametrically opposed strength members run the length of the cable sheath. Cuts must be between the strength members and must not damage them.

4.4 Push the Thermoplastic tubes -

Once the Thermoplastic tube is pulled out upto 100mtrs from the window cut portion, the pulled Thermoplastic tube is pushed inside a duct (7/3.5mm) for 30mtrs without much effort on the tube for connecting to the FDMS/ONT
4.5 Thermoplastic tubes Routing and Moisture Protection

Using a branching enclosure it is possible to re-route the Thermoplastic tubes directly to the dwelling by pushing it up to 30 metres inside a 3.5mm i/d duct. The branching joint is then used to enclose the window cut and re-establish the integrity of the cable, protecting against moisture ingress (see figure 9). Note: There are other ways of protecting these windows, such as heat shrinkable materials.

![Image of branching joint with Thermoplastic tubes Routing](image)

**Figure 9 Branching joint with Thermoplastic tubes Routing**

Whilst the cable ends are likely to be within an enclosure, it is good practice to seal then against moisture ingress into the cable sheath, or vice versa into the enclosure from the cable. Figure 10 is an example of a mechanical fitting cable end seal.

![Image of moisture blocking of the pull back cable end](image)

**Figure 10 Moisture Blocking of the Pull Back Cable End**

In summary, the Sterlite Pull Back Cable provides the installer with significant benefits. The methods described previously reduce installation times significantly, whilst also reducing the cost of installation.
Additionally, there is less pressure to connect directly to the home on day one because accessing the fibre at a later date is significantly easier and cheaper than conventional cabling systems.

5 Additional Information
If there are additional questions on this topic or other fiber optic issues, please contact Sterlite Tech at:

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