

# **Mid-Span Access of Loose-Tube Ribbon Fiber Optic Cable**



## Author

Prasanna Pardeshi and Sudipta Bhaumik

## Abstract

In fiber optic network, it is sometime necessary to splice large fiber count cables to smaller cables at a location other than at the end of the large cable, called mid-span entry. This application note provides guidelines on how to access fibers/ribbons at mid-point of Sterlite optical fiber cables.

## Keywords

Optical fiber cable, Loose Tube, Ribbon, Mid-span

## Introduction

Optical fiber due to its superior transmission capacity forms the foundation of today's optical fiber network. Generally during optical link construction, initially, optical fiber cables are joined into longer fiber links by end-to-end splicing of similar type optical fibers cable and the optical fiber cable were stored in the form of coils (20-50 meters) at several locations (manholes/hand holes/chambers) to ease the accessibility of fibers for branching/dropping for future needs. It is sometimes necessary to splice large fiber count cables to smaller cables at a location other than at the end of the larger cable. Rather than cutting the cable and splicing all the fibers, a mid span entry can be used to access only the fibers required for splicing to the smaller cable(s). Fibers are dropped off the main cable mid-span to connect with other cables/drop cables and the remaining fibers continue for service beyond the drop-off location. This type of fiber access is called cable mid-span access.

This application note describes the guidelines on how to access fibers/ribbons at mid-point of ribbon metallic armored optical fiber cables manufactured by Sterlite Technologies Ltd. This note also includes information of cable preparation of dielectric and armored cables containing bundled individual fibers/ribbon fibers. These procedures can be used for aerial, buried, and underground plant cables. During mid-span activity, care is required to ensure that the integrity and safety of the continuous fibers are maintained.

## Safety

### Safety Glasses

Sterlite recommends to wear safety glasses to protect eyes from accidental injury when working with fiber cables, especially when cutting the strength member or fibers.

### Safety Gloves









Wearing safety gloves to protect the hands from accidental injury is strongly recommended when working with sharp-bladed tools. Exercise extreme care when working with an exposed knife blade. Dispose all blades and armor scrap in a safe manner.

### Cable Handling Precautions

Fiber cable is sensitive to excessive stresses from mechanical loading caused by tension, bending, impact, or crushing over loading. The specification of the cable being used should be carefully examined before construction starts to understand the cable's mechanical limits. The minimum bend radius as well as all other mechanical limits of the cable and its components must not be violated.

## Tools

The following tools and materials are required to complete the procedures described in this document:

ACS TOOL: RING/ LONGITUDIN AL MARK		MARKING TAPE	
SCREW DRIVER		NOSE PLIERS	
KNIFE		SCISSOR	
CUTTER		TUBE SLITTER	

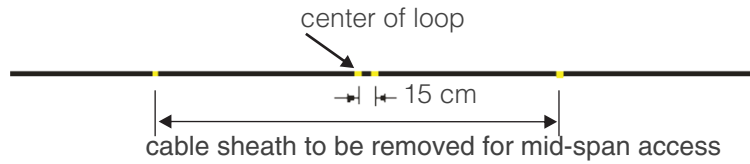
## Mid-span cable access

Determine the location on cable where the mid-span access is required. Mid-span splices can occur at points where fibers/ribbons are dropped off from the cable under preparation and spliced to a second cable to redirect few fibers/ribbons in a second direction. This point on the cable will serve as the “center of (the preparation) loop” for the cable being accessed. The centre position of the loop should be marked with a marking pen or a ring of tape to make initial window cut.



**Figure 1- Cable layout for mid-span access**

Make the marks on sheath by tape /marker of 15 cm at the left or right of the mid span portion, the marker 15 cm away will demarcate the sheath window that will be opened to enable the remainder of the cable jacket to be removed for the mid-span access window.

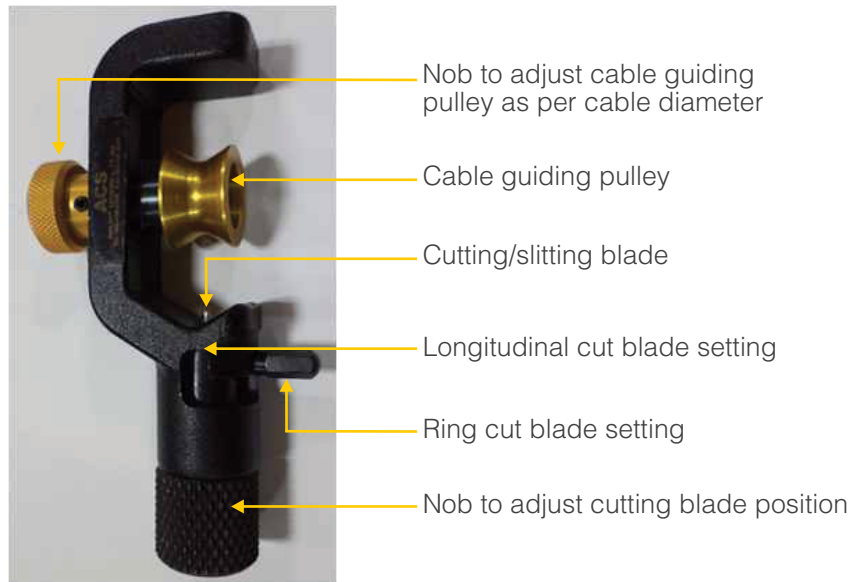


**Figure 2- Markers for mid-span access**

**ACS Tool**

The Miller ACS (Armored Cable Slitter) tool as shown below are recommended by Sterlite to remove the outer jacket, armoring, and inner jacket for mid-span access.

**Note:** The depth of cut for each blade needs to be adjusted to cut through the intended layer without damaging the cable core.



This tool can be used to remove the entire outer cable jacket between the two end markers for the mid-span access in one or several attempts. The tool is provided with detailed instructions by its manufacturer which should be carefully followed during the mid-span sheath removal procedure.

**Note:** The sheath should be removed in layers: first the outer jacket, then the armor (if present) and then the inner jacket (if present).

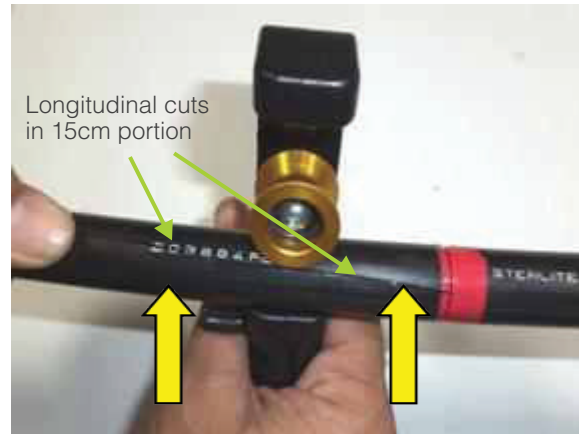
Make two ring cuts by ACS tool at both markers at 15 cm portion. Be sure the ring cut through its outer jacket to its armoring (if present) or cable core (if unarmored).



**Figure 3- Cable sheath being ring cut at the 15 cm window near the center of mid-span access window**



Mark two or more longitudinal cut over the cable at 15cm ring mark portion for easy separation of cable outer jacket from corrugated metallic tape. Make the cut mark clear by knife in case required.



**Figure 4- Cable sheath being longitudinally cut throughout the 15 cm portion at 2-3 places at the outer surface of the cable**

Lift up the cable outer jacket by screw driver at ring cut & longitudinal cut meeting point. Be careful that the screw driver knob shall not damage the cable core below metallic tape.



**Figure 5- Cable jacket access for removing/take off**

Take out the outer jacket of cable with the help of nose pliers for 15cm portion and subsequently remove corrugated metallic tape over the stranded core



**Figure 6- Removal of outer jacket by nose pillers at the 15 cm window**



Figure 7- Removal of outer jacket by nose piller at the 15 cm window



Figure 8- 15 cm window cut without outer sheath



Figure 9- Removal of metallic tape by nose pliers for 15cm window cut portion

Once the 15 cm section of cable jacket is removed, the remainder of the mid-span cable jacket can be removed by using the rip-cords that are exposed in the 15 cm window.



Figure 10- Exposed rip cords at the 15cm mid-span window



Figure 11- Cut the rip cord thread over the water blocking tape/ polyester tape using scissor



Figure 12- Slitting of cable jacket by using rip cord

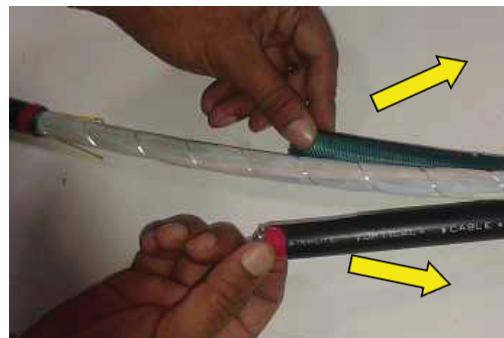


Figure 13- Slitted cable jacket : Remove cable jacket at mid span portion

**Note:** Take care so that the cable core and ripcords are not cut or damaged while cutting and removing the metallic armoring.

### Access to inner cable core/ tubes

Using a scissor/knife, cut the binding thread over the water blocking/poly ester tape of the bundled loose-tubes in the cable core.



Cut the water blocking/poly ester tape, peripheral yarns by using scissor

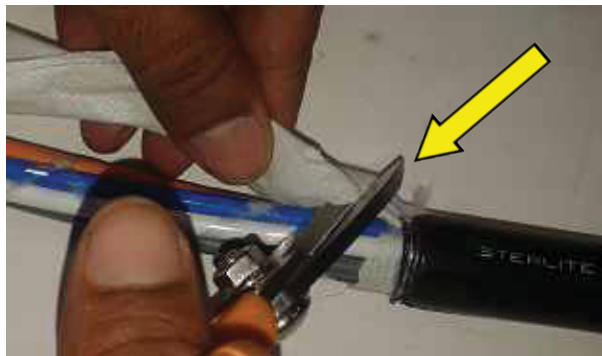


Figure 15- Cut the water blocking tape/poly ester tape by using scissor

Cut and remove the binders over the tubes to get accessibility to all the tubes

**Note:** Be careful, the tubes must not get damaged during all the above mentioned operations



Figure 16- Removal of the binding tape which bundles tubes in cable core using blade knife

Cut and remove CSM (Central strength member) to get easy accessibility to all tubes.

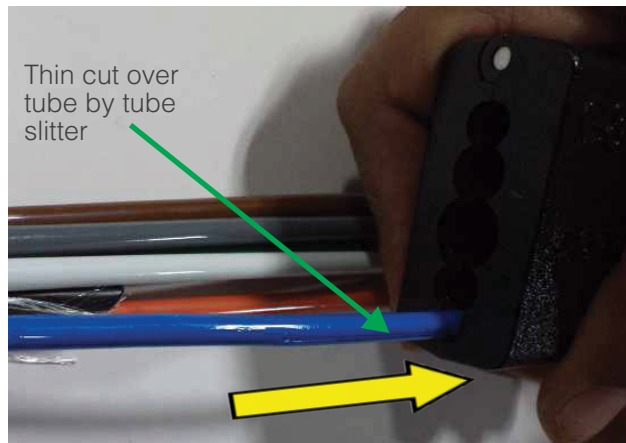


**Figure 17- Removal of the center strength member using small cutter**

**Note:** Cutting the central strength member frees all the loose buffer tubes from the mechanical protection provided by the cable. Take extreme care while handling the free loose buffer tubes. Any excess bend or tension to a free buffer tube could break fiber inside that tube. Color of a central strength member and filler rod is typically black or white. Care should be taken to avoid cutting of buffer tube, particularly white and black tube, containing optical fiber. Sterlite recommends to avoid cutting of any filler rods unless it is necessary due to storage space constraint. Filler rod/s can be coiled and stored similar to buffer tubes.

### Tube mid spanning

Select the tube on which mid-span need to be performed and make it straight by removing stranded lay. Fix the slitter tool slot over tube as per tube diameter and pull in other direction to get proper tube slitting.



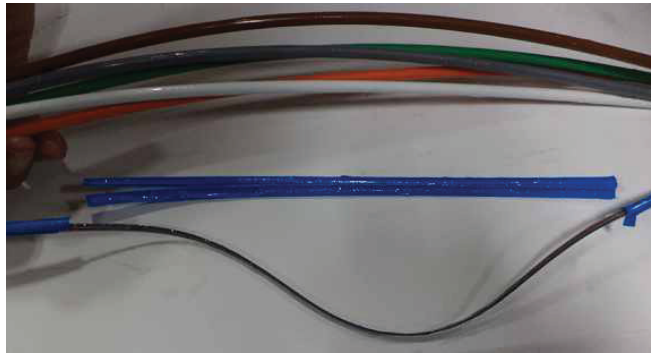
**Figure 18- Loose tube slitting by tube slitter**

Cut the tube covering by scissor or by making ring cut on tubes.



**Figure 19- Removal of tube covering by scissor**

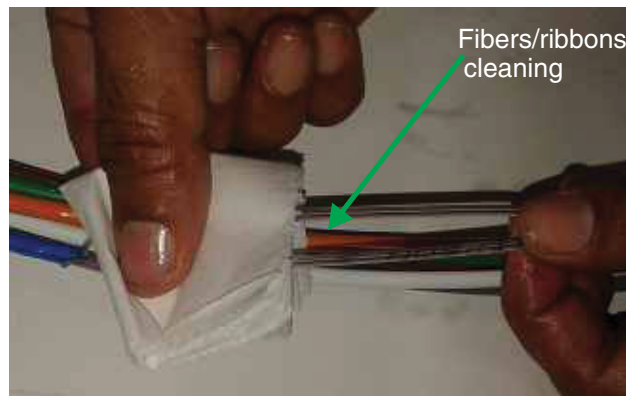
Cut the slitted tubes covering, clean the ribbons/fibers required for branching



**Figure 20- Cut the slitted tube covering**

**Note:** Be careful not to bend, kink, or damage any buffer tube.

Clean the gel or water blocking material from the buffer tubes and cable core using treated wipers.



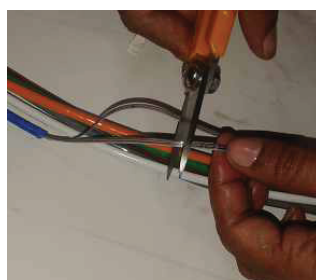
**Figure 21- Wipe the water blocking material from the fiber using a treated wiper**

It is necessary to enter one or more of the buffer tubes to access its fibers/ribbons to splice them to a second independent cable. The remaining fibers in the original cable will continue beyond this branch point.

If all the fibers in a buffer tube are to be dropped off at this point, make a ring cut at both locations in the buffer tube with the Ideal Coaxial Cable Slitter to demarcate the amount of fiber to be exposed for the fusion splice. These cuts will be in the appropriate buffer tube.

**Note:** To make a ring cut in the buffer tube, use a buffer tube cutter such as the Ideal coaxial cable splitter, sized to fit the buffer tube. Ring the buffer tube with several complete revolutions around the tube leaving the tube's surface scored through most of its thickness. The buffer tube can be opened by applying a bending motion on each side of the cut location.

Cut the drop off/branch off required fibers/ribbons and make splicing/joint with the other small cables as required.



**Figure 22- Cutting of branch off/drop off fibers by scissor**





## About STL - Sterlite Technologies Ltd

STL is a leading global optical and digital solutions company providing advanced offerings to build 5G, Rural, FTTx, Enterprise and Data Centre networks. The company, driven by its purpose of 'Transforming Billions of Lives by Connecting the World', designs and manufactures in 4 continents with customers in more than 100 countries. Telecom operators, cloud companies, citizen networks, and large enterprises recognize and rely on STL for advanced capabilities in Optical Connectivity, Global Services, and Digital and Technology solutions to build ubiquitous and future-ready digital networks. STL's business goals are driven by customer-centricity, R&D and sustainability.

Championing sustainable manufacturing, the company has committed to achieve Net Zero emissions by 2030. With top talent from 30+ nationalities, STL has earned numerous 'Great Place to Work' awards and been voted as the 'Best Organisation for Women'.

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