Sheath Removal and Mid-Span Access for MiDia® Microduct cables – 576f MiDia^{200} Micro GX

Contents **Section**

1. General

1.1 The following procedure describes sheath removal and mid-span access for OFS 576f MiDia^{200} Micro GX optical fibre microduct cable.

1.2 OFS *MiDia* microduct cables are single sheath, reduced diameter microduct cables. The cable specification is summarised in Table 1. Depending on the cable type and fibre count, these cables may contain 6, 8, 12, or 24 buffer tube positions. The 576f count cable contains 24 buffer tubes. The gel-filled buffer tubes each contain 24 fibres. *MiDia* microduct cables are optimised for air-blown microduct applications. Please refer to OFS *Microduct cable Guidance & Installation*, for details regarding cable installation.

Table 1 - OFS 576f MiDia^{200} Micro GX cable

Cable Type	OD in mm (in.)	Tensile Performance		Minimum Bend Diameter		
				Static	Dynamic	Storage
		Short Term	Long Term	Handling	(During Installation) (Under Load)	Coil (Minimum)
		N (lb)	N (lb)	mm (in.)	mm (in.)	mm (in.)
MiDia^{200} Micro GX 576 fibres	9.8 (0.38) or 9.6 (0.37)	3000 (674)	800 (179)	460 (18.0)	500 (15.74)	460 (18.0)

2. Precautions

2.1 Please refer to Table 1 for the Tensile Performance where the short-term load (dynamic condition) applies during cable installation and the long-term load (static condition) applies during operation i.e. after installation is completed.

2.2 OFS microduct cables are designed for blown cable installation and should not be installed using cable winches. If hand pulling is required, breakaway pulling swivels should be used to assure that the short-term load is not exceeded. Cable lubricants are recommended for use in both air-blown and hand-pulling applications.

2.3 Care must be exercised during cable installation to ensure that the cable's minimum bend diameter is not violated. The cable Bending Performance is shown in Table 1 for both dynamic (during installation) and static (installed) conditions. In addition, the minimum storage coil diameter for all *MiDia* cables is 460 mm (18 in.).

3. Recommended Tools

3.1 The following tools and supplies are recommended for end-prep and mid-span cable access. **Caution:** Safety glasses should always be worn when working with optical fibre cables.

- Cable Slitter Tool - Miller MB02 (MB02-7005) With – Ø5-12mm insert at 0.6mm Depth for 9.8mm Diameter Cable (MB02-7-1200060) & Ø5-12mm insert at 0.5mm Depth for 9.6mm Diameter Cable (MB02-7-1200050)
- Buffer Tube Scoring Tool - Miller Red FTS-005 (80990)
- Buffer Tube Midspan Tool - Miller MSAT-X (MB10-7000)
- Kevlar Scissors
- Cable shears
- Diagonal cutters (side cutters)
- Pliers
- Tape measure
- Lint free wipes
- 99% Isopropyl alcohol
- Cable Stripping Gloves
- Safety glasses
- Fibre Bin
- Fibre Pick Tool
- White Permanent Marker Pen
    - MB02 Replacement Blade Set (MB02-7500)
    - MSAT-X Replacement Blade Set (MB10-7500)

The tools listed above & pictured below are available as a kit with the part number - **MA03-7066**

4. End Prep Sheath Removal for *MiDia* Microduct Cables

Note: Tube Identification

Before 'end prep sheath removal', strip 30-50mm of sheath and use the below table and/or refer to cable datasheet, to mark the outer layer buffer tubes of the cable with permanent marker (Sharpie) to allow for visual identification for the first Blue, Orange and Green of the outer buffer tubes. This allows for collaring of the buffer tubes as the outer layer of the cable gets dressed later in the splice closure build.

Identification

Tube Colour Code:

1+10+22	Blue	**2+11+23**	Orange	**3+12+24**	Green	**4+13**	Brown	**5+14**	Grey	**6+15**	White
7+16	Red	**8+17**	Black	**9+18**	Yellow	**19**	Violet	**20**	Rose	**21**	Aqua

Table 1 - Buffer Tube Identification

4.1 Consult the splice closure instructions for the required length of cable sheath that must be removed. Measure and mark the cable with Sharpie or tape at the appropriate stripping length (Figure 1).

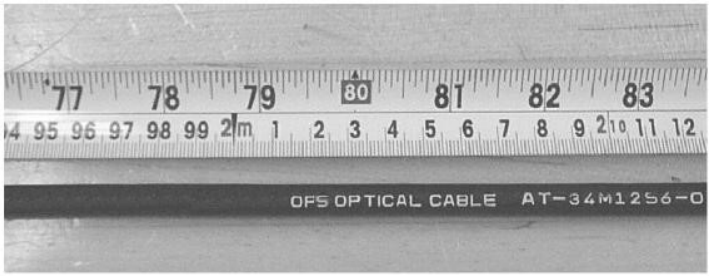


Figure 1 - Measure and mark the cable.

4.2 Use the Miller MB02 to ring cut the cable at the measured mark, by lightly scoring rather than cutting all the way through the cable sheath (Figure 2).

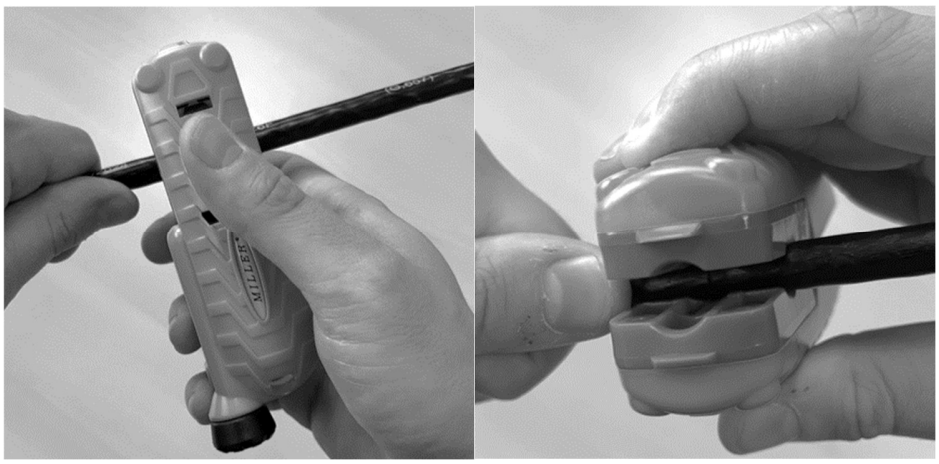


Figure 2 - Ring cut the cable sheath

4.3 Gently flex the cable at the ring cut with a circular motion, being careful not to breach the minimum bend diameter. The cable sheath will separate at this point (Figure 3).

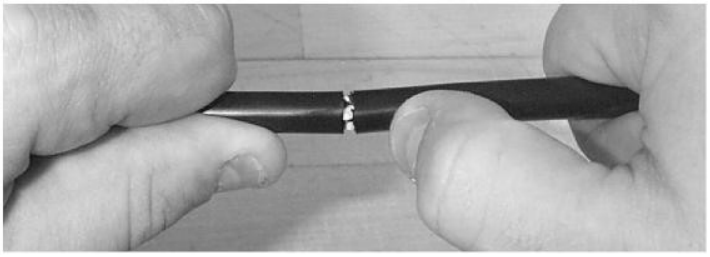


Figure 3 - Flex the cable to separate the sheath

4.4 Make a second ring cut approximately 130 mm from the cable end. As in the previous step, gently flex the cable in a circular motion to separate the cable sheath at the ring cut.

4.5 Generally, the 130 mm section of outer sheath can be removed by sliding it over the end of the cable. If not, use the Miller MB02 in its longitudinal slot to make a cut between the ring cut and the end of the cable (Figure 4).

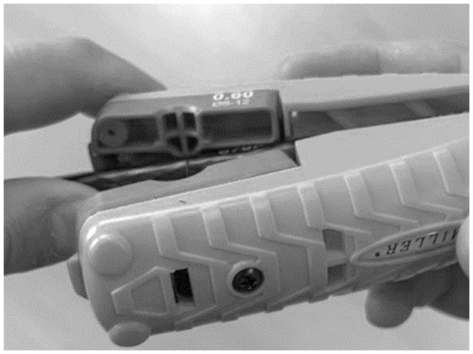


Figure 4 - If necessary, cut the cable sheath longitudinally before removal

4.6 Remove the 130mm section to expose the rip cord (Figure 5).

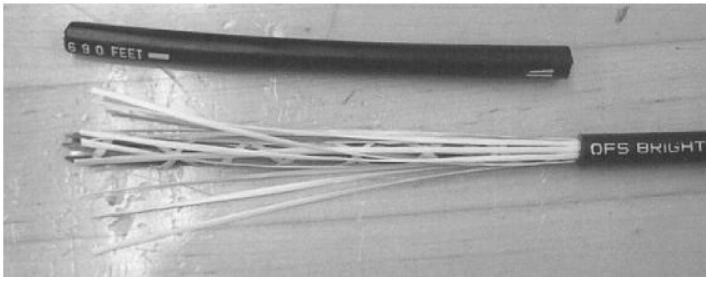


Figure 5 - Remove the 130 mm section to expose the ripcord

4.7 Locate and pull the ripcord to the next ring cut (Figure 6). Sometimes a small starter slit is needed to start the ripcord. If desired, wrap the ripcord around a pair of pliers to grip the ripcord.

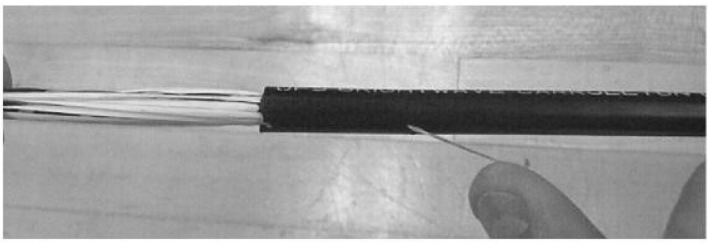


Figure 6 - Pull the ripcord to the next ring cut

4.8 Remove the cable outer sheath to expose the core of the cable (Figure 7).

Figure 7 - Remove the outer sheath

4.9 Outer Core Preparation: Remove the binder threads from the 15 buffer tubes core and cut them flush with the outer sheath (Figure 8).

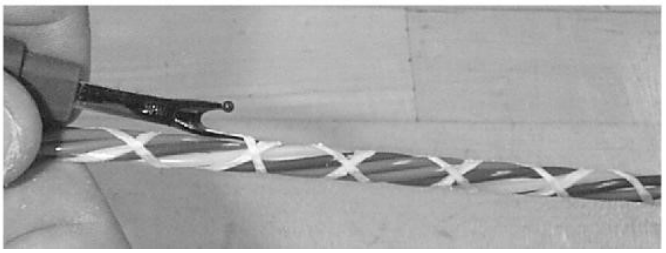


Figure 8 - Remove and cut the Outer Core binder threads

4.10 Carefully unwrap the 15 outer buffer tubes from each other and remove any threads from between the buffer tubes making sure to take note of the buffer tube identification as referred to in section in Table 1. Also, make sure outer core buffer tubes are separated i.e. grouped together with use of tape before addressing inner core. (Figure 9)

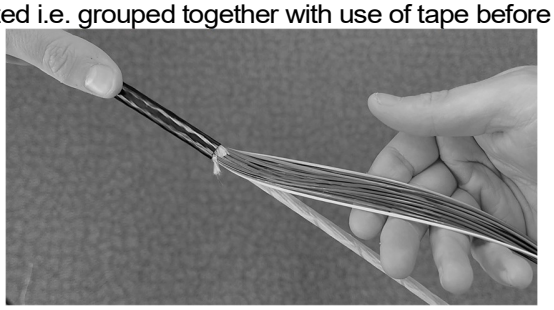


Figure 9 - Unwrap the Outer Core buffer tubes

4.11 Inner Core Preparation: Carefully use Kevlar scissors to remove the water blocking tape (Figure 10) and any binder threads which surround the 9 inner buffer tubes making sure to remove in small sections of 300 – 400mm. This will result in the threads and tape being flush to the outer sheath. The 9 buffer tubes can then be unwrapped exposing the central strength element which can be cut to required length (consult splice closure instructions). (Figure 11).

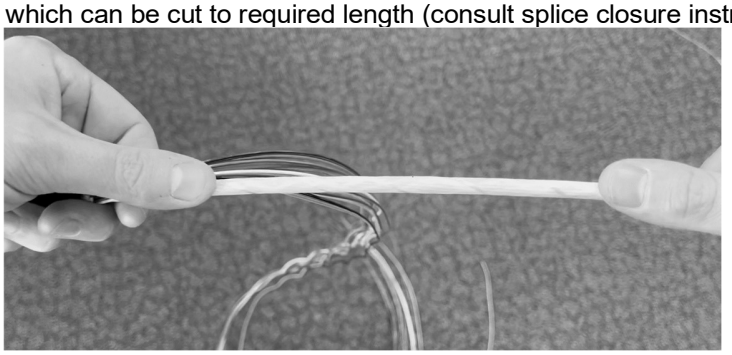


Figure 10 – Water Blocking tape separating Inner Core buffer tubes.

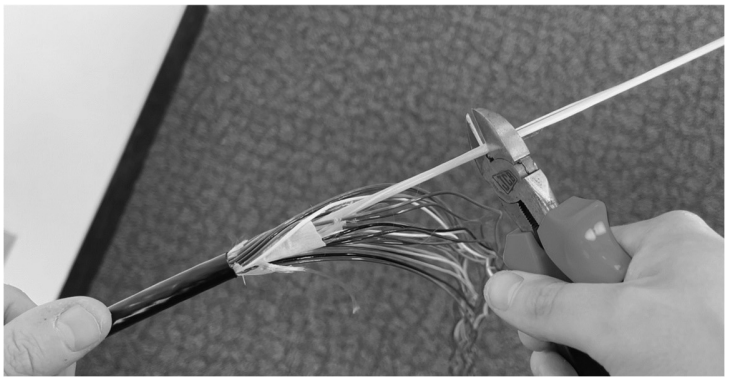


Figure 11 - Cut the central strength member to the required length.

4.12 Consult the splice closure instructions to determine the length of fibre that must be exposed. Use the recommended Miller FTS buffer tube scorer to score the buffer tubes (Figure 12) at the required length. **Make only one revolution around the tube**. The tube should be scored rather than cut. When removing a long length of tube, it is necessary to remove the tube in 300 mm to 400 mm sections. Do not remove sections greater than 400mm as this may result in fibre damage.

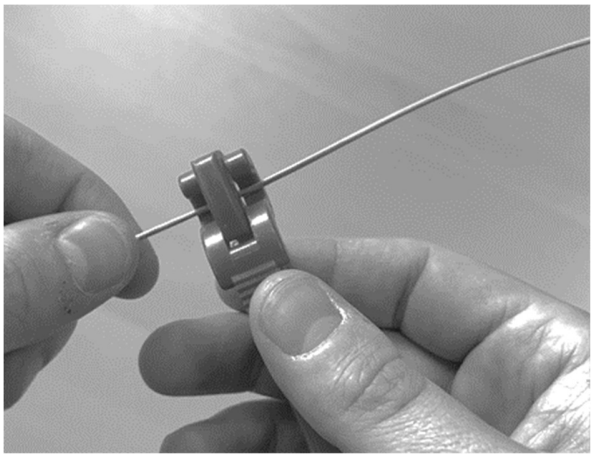


Figure 12 - Score the buffer tubes

4.14 Grasp the tube on both sides of the score mark and gently flex to separate the tube (Figure 13).

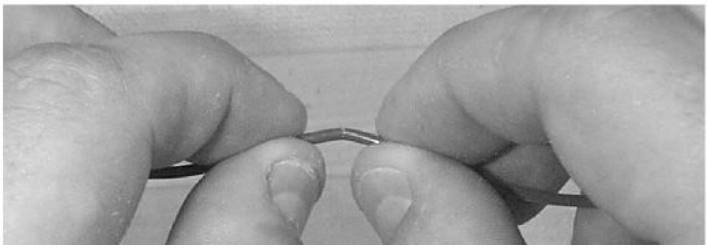


Figure 13 - Flex and separate the tube at the score mark

4.15 Remove the buffer tube segment with steady pulling force to expose the fibres, repeat until correct length is exposed. (Figure 14)

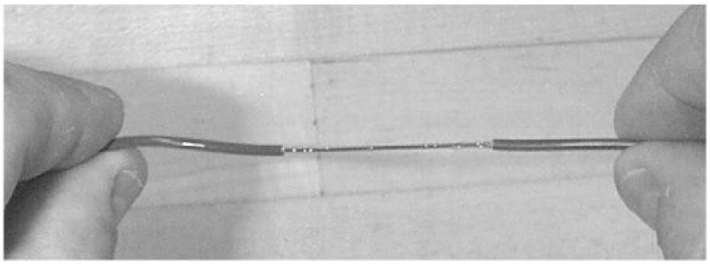


Figure 14 - Remove the buffer tube from the fibres

4.16 Carefully clean the exposed fibres using a lint-free wipe soaked with isopropyl alcohol (Figure 15).

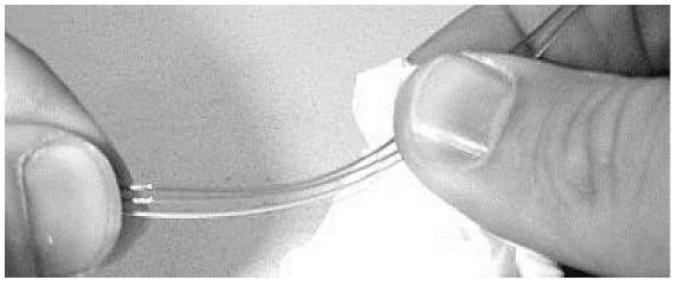


Figure 15 - Carefully clean the fibres

4.17 The cable is now ready for testing and/or splice closure preparation.

5. Mid-Span Sheath Removal for *MiDia* Microduct Cables

Note: *Before any Mid-span preparations please consult splice closure to determine span length requirements. Keeping in mind that the cable has an Inner and Outer layer in which the reversal point can be found in separate locations.*

5.1 To begin Mid-span procedure, measure and mark two points 300mm apart on the area of sheath to be removed for the reversal point of the buffer tubes to later be identified. (Figure 16).

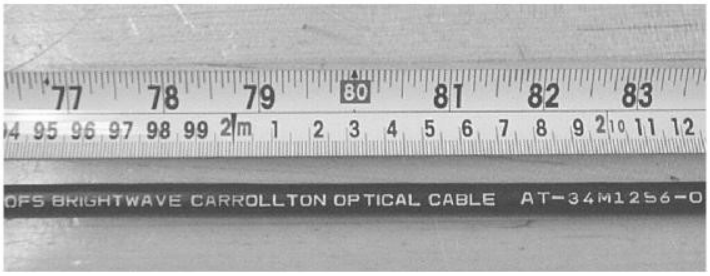


Figure 16 - Measure and mark the cable.

5.2 Use the Miller MB02 to ring cut around the cable at one of the measured marks. Lightly score the cable sheath rather than cut all the way through (Figure 17).

Figure 17 - Ring cut the cable sheath

5.3 Using a circular motion, gently flex the cable at the score mark to separate the outer sheath (Figure 18). Be careful not to breach the minimum bend diameter of the cable.

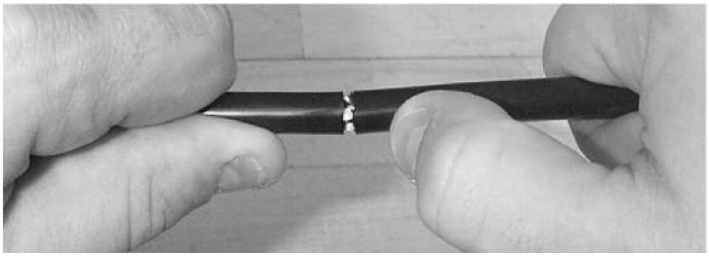


Figure 18 - Flex the cable at the score mark to separate the outer sheath

5.4 Repeat steps 5.2 and 5.3 at the other measured mark.

5.5 Use the Miller MB02 to make a longitudinal cut between the two ring cuts (Figure 19).

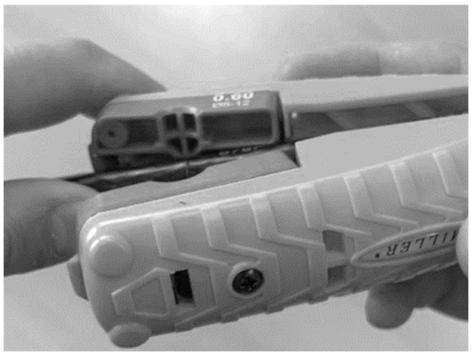


Figure 19 - Make a longitudinal cut between the two ring cuts

5.6 Remove the 300mm section of outer sheath to expose the inside elements and the cable cores. (Figure 20).

Figure 20 - Remove the 300mm section of outer sheath

5.7 Locate the cable ripcord and cut it in the middle to allow for sheath removal later (Figure 21).

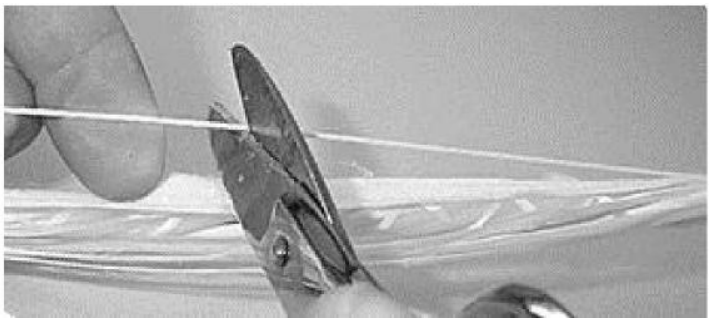


Figure 21 - Cut the ripcord

5.8 Locate a buffer tube reversal point **(where the buffer tubes change direction)** by removing the outer cable sheath in 300 mm sections. The reversal point is where the twist of the buffer tubes changes direction (Figure 22) Also make sure to identify the outer core buffer tubes as mentioned in 'Tube Identification' at the beginning of the guide. If reversal point hasn't been located fully within the first sheath removal, carefully remove (to the left and right) 300mm sections of the outer cable sheath until the reversal point is located making sure not to puncture existing exposed buffer tubes.

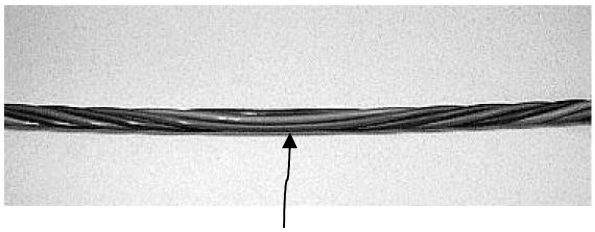


Figure 22 - Reversal Point

5.9 Consult the splice closure instructions to determine the length of outer cable sheath that must be removed for the mid-span splice. Centre the sheath opening at the reversal point. Measure equal distances from the reversal point and mark the sheath opening with Sharpie Pen (Figure 23).

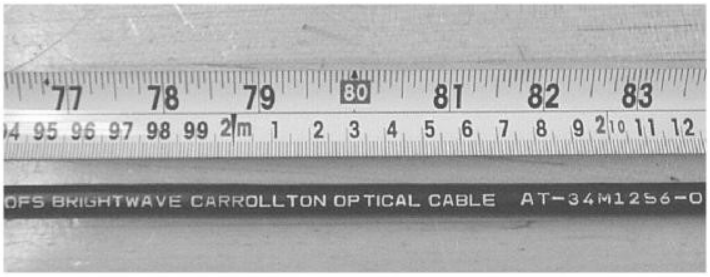


Figure 23 - Measure and mark the mid-span sheath opening

5.10 Again, use the Miller MB02 to ring cut the cable at one of the measured marks. Lightly score the outer cable sheath rather than cut all the way through (Figure 24).

Figure 24 - Ring cut the outer cable sheath

5.11 Gently flex the cable at the score mark to separate the cable sheath (Figure 25). Be careful not to breach the minimum bend diameter.

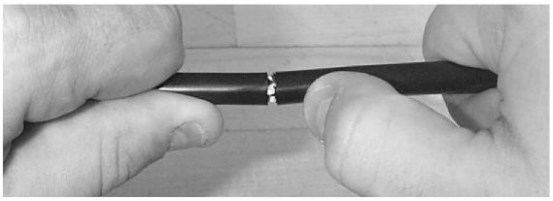


Figure 25 - Flex the cable to separate the sheath

5.12 Repeat steps 5.10 and 5.11 at the other measured mark.

5.13 Locate and pull each ripcord to the ring cut (Figure 26). Sometimes a small starter slit is needed to start the ripcord. If desired, wrap the ripcord around a pair of pliers to grip the ripcord. Remove the outer cable sheath.

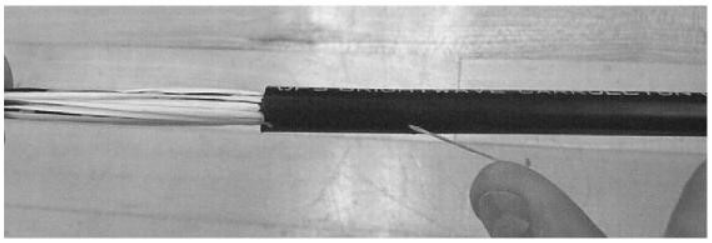


Figure 26 - Pull the ripcord to open the outer cable sheath

5.14 Repeat steps 4.10 & 4.11 on the outer core of the cable i.e. where the 15 outer buffer tubes are present (Figure 27).

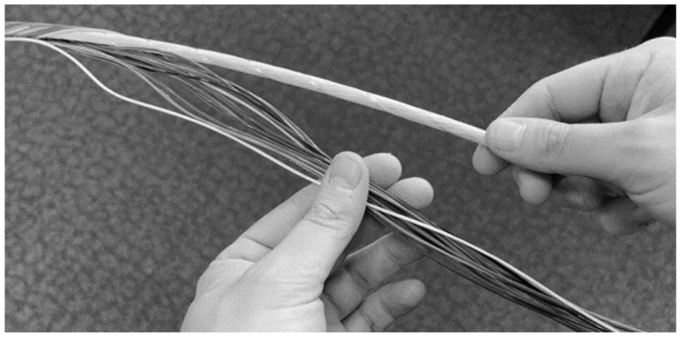


Figure 27 - Unwrap the Outer buffer tubes from Reversal Point

5.15 Repeat step 4.12 for the inner core of the cable whilst splitting the central strength member in the middle i.e. the reversal point (Figure 28).

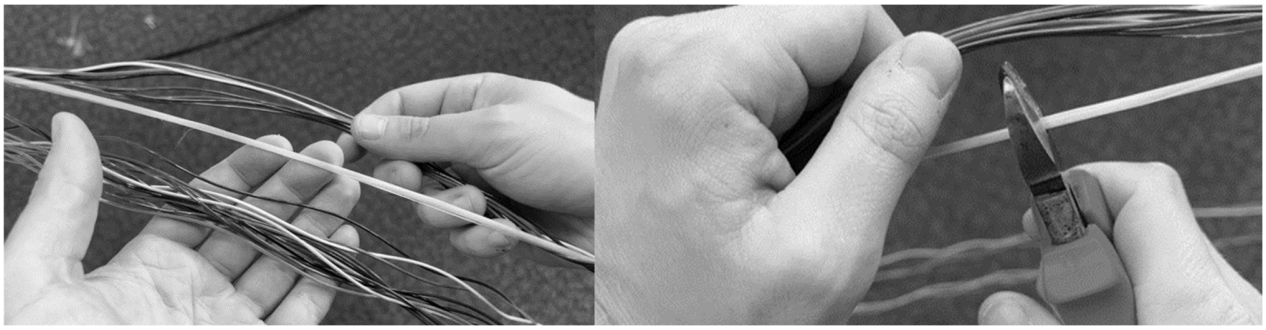


Figure 28 - Unwrap the Inner buffer tubes and CSM at same reversal point.

5.16 Consult the splice closure instructions to determine the length of central strength member that is required for strain relief. With the separated strength member, it is now appropriate to cut it to the required length on both sides. (Figure 29).

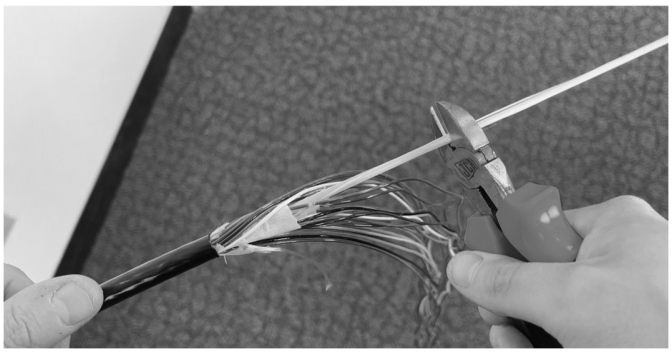


Figure 29 - Cut the central strength member

5.17 The cable can now be fastened into the splice closure.

5.18 If all fibres in a particular tube are to be spliced, **cut the tube free at the appropriate location.**

5.19 Use a buffer tube stripper to score the buffer tube (Figure 30). Make only **one** revolution around the tube. The tube should be scored rather than cut.

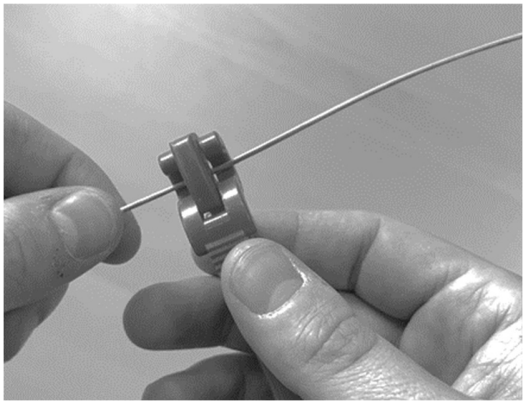


Figure 30 - Score the buffer tube

5.20 Grasp the tube on both sides of the score mark and gently flex the tube to separate it (Figure 31). Remove the buffer tube to expose the fibres. If a long section of buffer tube must be removed, it is recommended that the tube be removed in several short pieces about 300 mm to 400 mm in length.

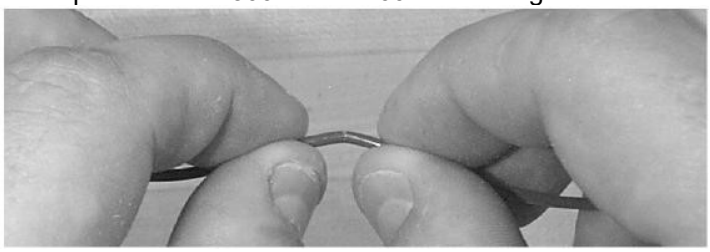


Figure 31 - Separate the buffer tube

5.21 Clean the exposed fibres using a lint free wipe soaked with isopropyl alcohol (Figure 32). Fasten the tube(s) to their corresponding splice organizing tray.

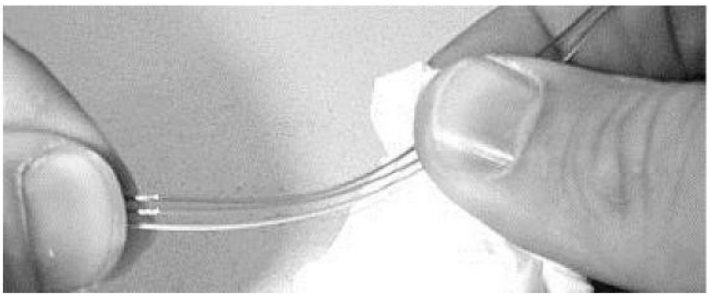


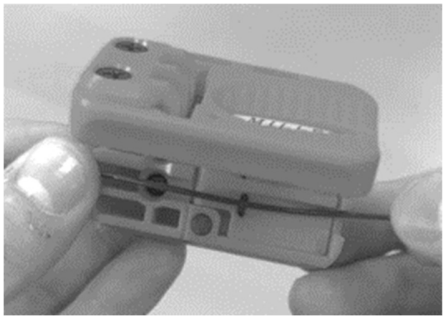
Figure 32 - Clean the optical fibres

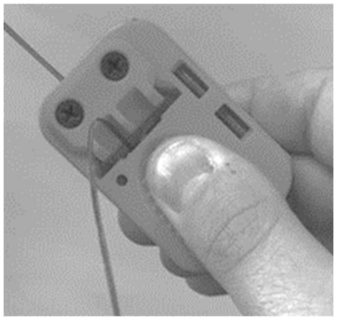
5.22 The fibres are now ready for splicing.

5.24 If fibres in a particular tube are to be spliced to a mid-span tap or select fibres in the same tube are to remain continuous, a mid-span access tool is required to open the buffer tube. Refer to Figure 33 for Miller MSAT X Shaver tool on these cables 1.4mm buffer tube.

Figures 33 - Miller MSAT X Shave tool

5.25 Insert buffer tube to **'Shallow'** (Green) slot to begin to shave, making sure to pull towards you with thumb pressing down firm on 'miller' groove. Extract fibres using appropriate fibre picking tool and always clean using lint free wipes soaked with isopropyl alcohol. If required fasten the buffer tube(s) to their appropriate splice organising tray. Refer to Figures 34 & 35.





Figures 34 & 35 – Buffer tube inserted into 'Shallow' insert

For additional information please visit our website at www.ofsoptics.com