# Sheath Removal of Armored ALTOS® Fiber Optic Cables

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## 1. General

**1.1** This procedure describes general sheath removal methods for armored Corning Cable Systems ALTOS cables.

**1.2** Armored ALTOS cable are rugged fiber optic cables featuring buffer tubes and dielectric central members protected by water blocking tape and yarn.

**1.3** Two versions of the cable are available: standard armored ALTOS cable and Lite armored ALTOS cable. (Figure 1):

Standard armored ALTOS cable has an inner and outer sheath.

Lite armored ALTOS cable has only an outer sheath.

**Note:** *Steps that reference dielectric yarns are only required for cable designs incorporating these yarns.*

**1.4** This issue includes a new cable handling precaution about filler rods and a precaution about rip cord use with armored cables.

## 2. Precautions

### 2.1 General Precautions

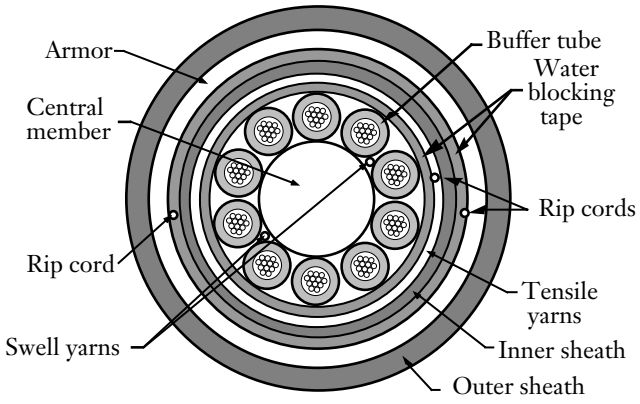
**Safety Gloves**

**CAUTION:** *The wearing of safety gloves to protect your hands from accidental injury when using sharp-bladed tools is strongly recommended. Use extreme care when the utility knife's blade is exposed. Properly dispose of used blades.*

**Safety Glasses**

**WARNING:** *The wearing of safety glasses to protect the eyes from accidental injury is strongly recommended when cutting central members and fiber.*

Standard Armored ALTOS Cable




Lite Armored ALTOS Cable

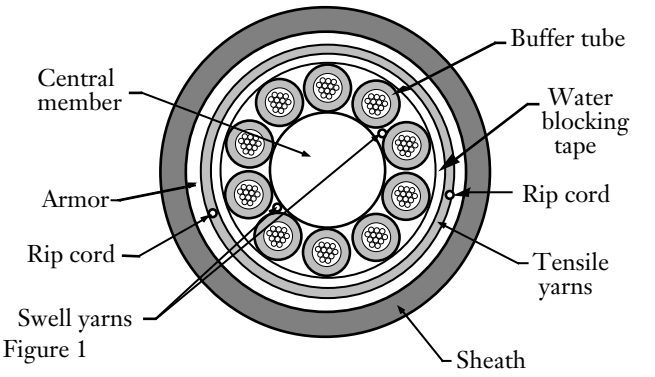



Figure 1

### 2.2 Cable Handling Precautions

**CAUTION:** *Filler rod color may vary from cable to cable. Typical filler rod colors are natural (off-white) and black. Careful attention should be taken to avoid accidental cutting of live buffer tubes; particularly white and black tubes. In mid-span applications, CCS recommends coiling all tubes and filler rods in the slack storage area of the splice closure; especially for cables with fiber counts above 96 fibers. Avoid cutting any filler rods unless necessary for storage space considerations. When in doubt regarding the buffer tube color code and filler rod placement, contact CCS Engineering Services for assistance prior to cutting.*

**CAUTION:** *Fiber optic cable is sensitive to excessive pulling, bending and crushing forces. Consult the cable specification sheet for the cable you are installing. Do not bend cable more sharply than the minimum recommended bend radius. Do not apply more pulling force to the cable than specified. Do not crush the cable or allow it to kink. Doing so may cause damage that can alter the transmission characteristics of the cable- the cable may have to be replaced.*

**2.3 Chemical Precautions**

**Fiber-Clean Wipes**

**WARNING:** *Contains hydrocarbons. Apply in rooms having normal room ventilation. For prolonged and/or repeated use, gloves are recommended. Avoid eye contact. Keep away from open flames and ignition sources.*

*If ingested, do not induce vomiting. Consult a physician. If contact with eyes, wash eyes with water for 15 minutes.*

## 3. Tools and Materials

**3.1** This procedure requires the following basic tools:

- Utility knife with hook blade
- Scissors
- Diagonal cutting pliers
- Vinyl tape
- Seam ripper
- Tape measure
- Ideal® coaxial cable stripper
- Fiber-Clean® cleaning wipes if filling compound is present
- Lint-free tissues

All of these items are contained in the Corning Cable Systems Sheath Removal Tool Kit (TKT-005), or in the Fusion Splicing Tool Kit (M67-003).

## 4. Cable Preparation

**4.1** Refer to the documentation for the hardware in which you are installing the cable for the required sheath removal lengths.

**4.2** Mark the cable at the appropriate distance from the cable end with a wrap of tape (Position 1 in Figure 2).

**4.3** Position another wrap of tape 2.5 cm (1 in.) from "Position 1" for later placement of a grounding clip ("Position 1A" in Figure 2).

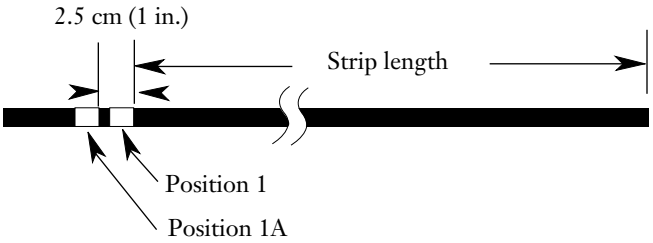



Figure 2

**4.4** Verify that you are working with an armored version of ALTOS cable by examining the end of the cable or by checking the cable specification sheet:

- If the cable is armored, determine whether you are are working with the Lite or standard version of armored ALTOS cable. Standard versions have two sheath layers.

- If the cable is not armored, refer to SRP-004-077, *Sheath Removal of Non-armored ALTOS® Fiber Optic Cables.*

**Note:** *Before proceeding, anchor the cable securely to the work area using tape or cable ties; otherwise, two craftspersons will be required.*

***If you are working with standard armored ALTOS cable, proceed with step 5.1; if you are working with Lite armored ALTOS cable, skip to Section 6 on page 4.***

## 5. Standard Armored ALTOS Cable Sheath Removal

**5.1** Using a hook blade knife, make a ring cut through the outer sheath of the cable at the tape mark at "Position 1." *Use care to avoid damaging the inner sheath* (Figure 3).

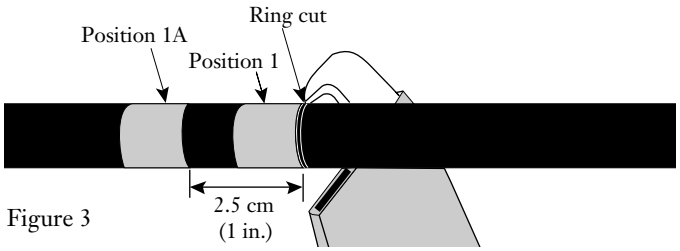



Figure 3

**5.2** Gently flex the cable at the cut to break the armor. DO NOT violate the minimum bend radius of the cable during this step.

**5.3** Use a hook blade to ring cut the outer sheath15 cm (6 in) from the end of the cable.

**5.4** Gently bend the cable at this second ring cut to break the armor (Figure 4). DO NOT violate the minimum bend radius of the cable during this step.

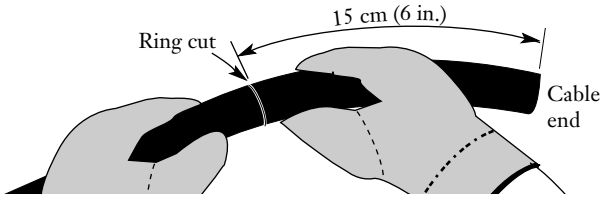



Figure 4

**5.5** Position the blade of the hook blade knife at the ring cut so that it can travel down the cable between the armor and the inner sheath towards the cable end.

*Hold the knife at a 45° angle to the cable to prevent the blade from slipping out of the sheath.*

Slit the 15 cm (6 in.) section of cable sheath and armor by holding the arm which has the knife out straight and pulling the cable "through" the hook blade with your other hand (Figure 5).

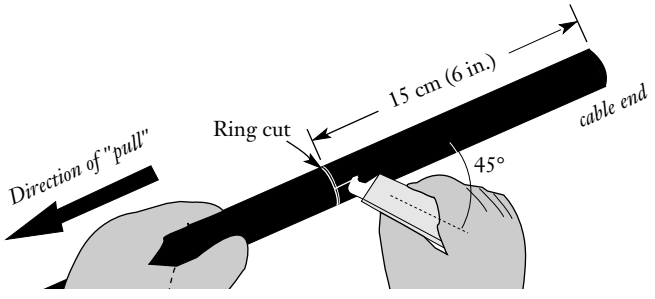



Figure 5

**5.6** Peel the 15 cm (6 in.) section of sheath and armor from the end of the cable – *use care during this step to avoid damaging the cable core* (Figure 6).

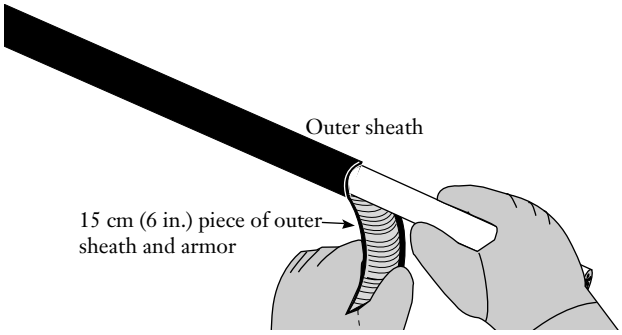



Figure 6

**5.7** Break off the 15-cm section of sheath and armor at the ring cut

**5.8** Locate the two rip cords. Using the hook blade, cut starting notches in the outer cable sheath (Figure 7).

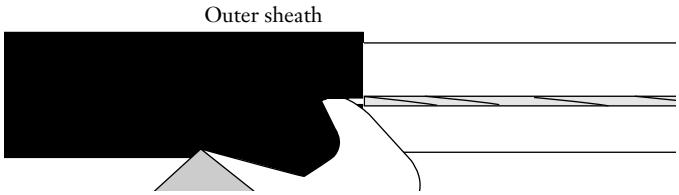



Figure 7

**CAUTION:** *Before pulling the rip cords on armored cables, first inspect the cable to identify the orientation of the armor tape overlap. If the rip cord moves under this overlap while pulling, it may break. When pulling the rip cords on armored cables, always pull away from the armor overlap to reduce the possibility of the rip cord breaking.*

**5.9** Wrap the rip cord around the shaft of a screwdriver, short section of scrap cable, or other object which can serve as a handle.

**5.10** Pull the rip cord through the sheath to the tape mark at Position 1A to accommodate application of grounding hardware on the armor (Figure 8).

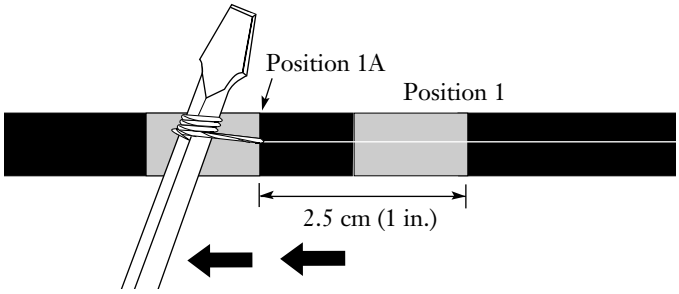



Figure 8

**5.11** Repeat steps 5.9 and 5.10 with the remaining rip cord.

**5.12** Cut the rip cords flush at the tape mark with scissors.

**5.13** Starting at the end of the cable, pull ("banana peel") the outer sheath and armor back over and away from the cable end, back to the Position 1 ring cut (Figure 9).

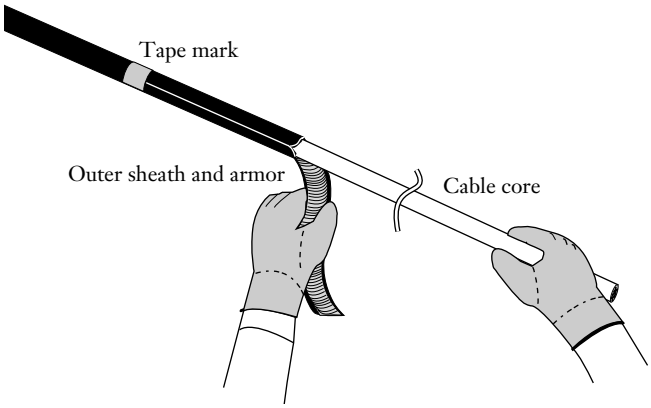



Figure 9

**5.14** Break off the split outer sheath and armor at the Position 1 ring cut.

**5.15** Use scissors to cut any remaining water-blocking tape flush with the Position 1 tape wrap (Figure 10).

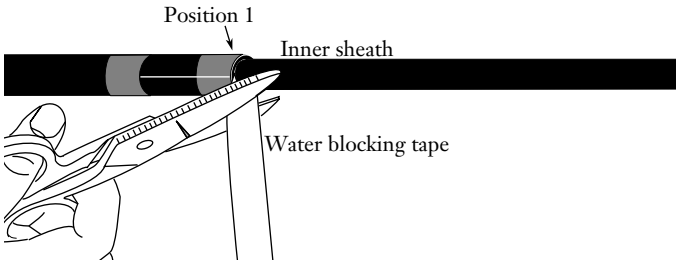



Figure 10

**5.16** Use the hook blade to ring cut the inner sheath 15 cm (6 in) from the end of the cable (Figure 11).

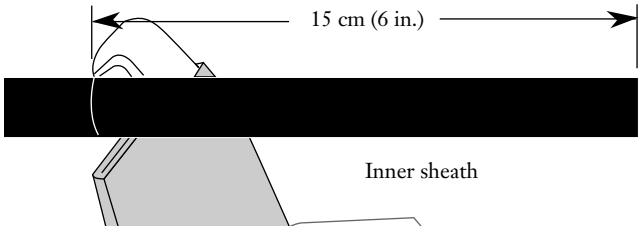



Figure 11

**5.17** Position the blade of the hook blade knife at the ring cut so that it can travel down the cable between the inner sheath and the cable core towards the cable end.

*Hold the knife at a 45° angle to the cable to prevent the blade from slipping out of the sheath.*

Slit the 15 cm (6 in.) section of cable sheath by holding the arm which has the knife out straight and pulling the cable "through" the hook blade with your other hand (see Figure 5).

**5.18** Peel the 15 cm (6 in.) section of inner sheath from the end of the cable – *use care during this step to avoid damaging the cable core* (Figure 12).

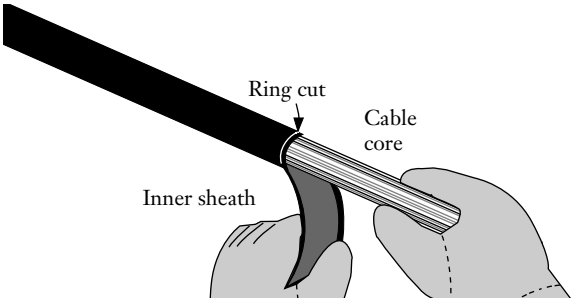



Figure 12

**5.19** Locate and separate the rip cord from the yarn surrounding the cable core. Cut a starting notch in the inner cable sheath as shown in Figure 7.

**5.20** Wrap the rip cord around a handle just as you did when removing the outer sheath. Pull the rip cord through the sheath to the wrap of tape at Position 1. Cut the rip cord flush at the tape mark.

**5.21** Carefully separate the inner sheath from the yarn-covered cable core back to the Position 1 tape mark (Figure 13).

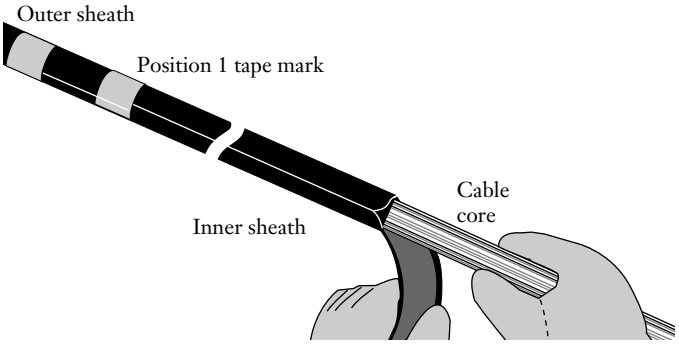



Figure 13

**5.22** Trim off the split section of inner sheath at the tape mark with side cutters (Figure 14) or scissors.

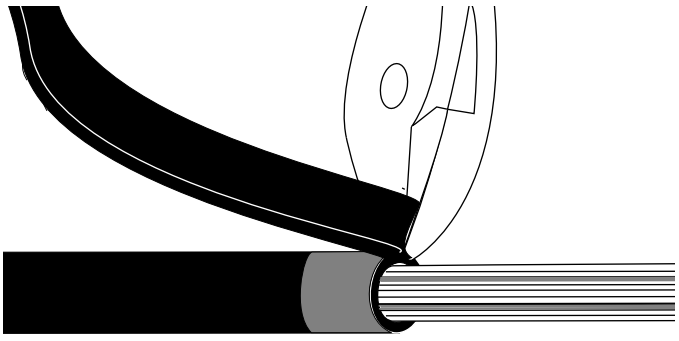


Figure 14

**5.23** Proceed to Section 7, *Accessing ALTOS Cable Cores.*

## 6. Lite Armored ALTOS Cable Sheath Removal

**6.1** Using a hook blade knife, make a ring cut through the outer sheath of the cable at the Position 1 tape mark. *Use care to avoid damaging the buffer tubes* (Figure 15).

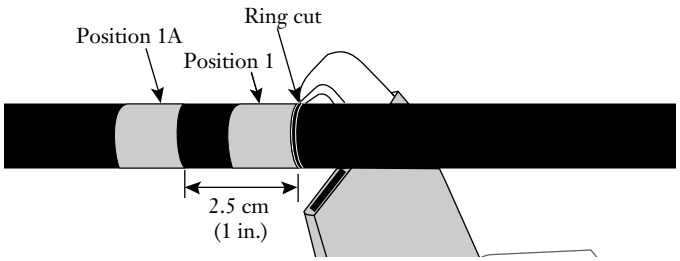



Figure 15

**6.2** Gently flex the cable at the cut to break the armor. DO NOT violate the minimum bend radius of the cable during this step.

**6.3** Use a hook blade to ring cut the sheath 15 cm (6 in) from the end of the cable.

**6.4** Gently bend the cable at this second ring cut to break the armor (Figure 16). DO NOT violate the minimum bend radius of the cable during this step.

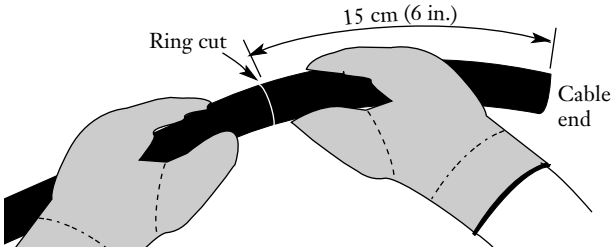



Figure 16

**6.5** Position the blade of the hook blade knife at the ring cut so that it can travel down the cable between the armor and the cable core towards the cable end.

*Hold the knife at a 45° angle to the cable to prevent the blade from slipping out of the sheath.*

Slit the 15 cm (6 in.) section of cable sheath and armor by holding the arm which has the knife out straight and pulling the cable "through" the hook blade with your other hand (Figure 17).

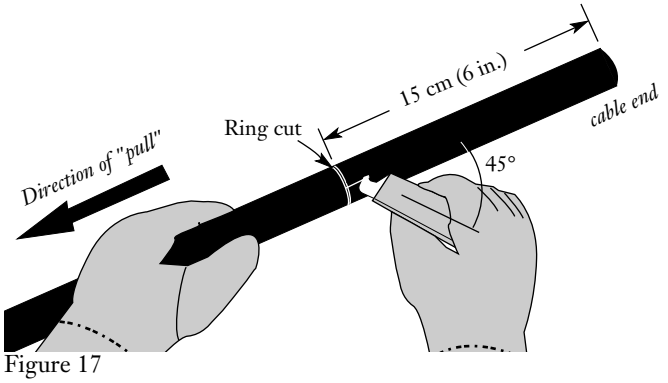



Figure 17

**6.6** Peel the 15 cm (6 in.) section of sheath and armor from the end of the cable – *use care during this step to avoid damaging the cable core* (Figure 18).

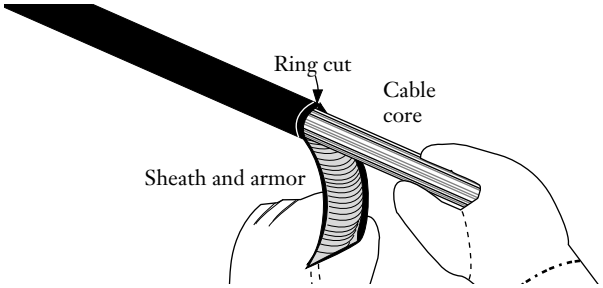



Figure 18

**6.7** Break off the 15-cm (6 in.) section of sheath and armor at the ring cut.

**6.8** Locate and separate the rip cords from the yarn surrounding the cable core. Using the hook blade, cut starting notches in the outer cable sheath (Figure 19).

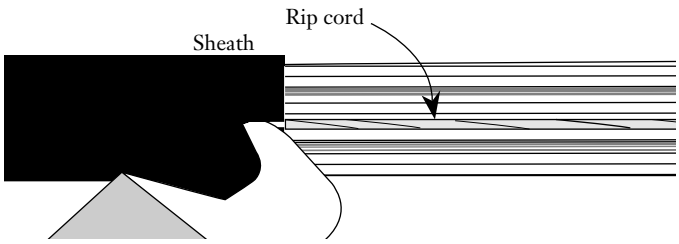



Figure 19

**CAUTION:** *Before pulling the rip cords on armored cables, first inspect the cable to identify the orientation of the armor tape overlap. If the rip cord moves under this overlap while pulling, it may break. When pulling the rip cords on armored cables, always pull away from the armor overlap to reduce the possibility of the rip cord breaking.*

**6.9** Wrap one of the rip cords around the shaft of a screwdriver, short section of scrap cable, or other object which can serve as a handle.

**6.10** Pull the rip cord through the sheath to the tape mark at Position 1A to accommodate application of grounding hardware on the armor (Figure 20).

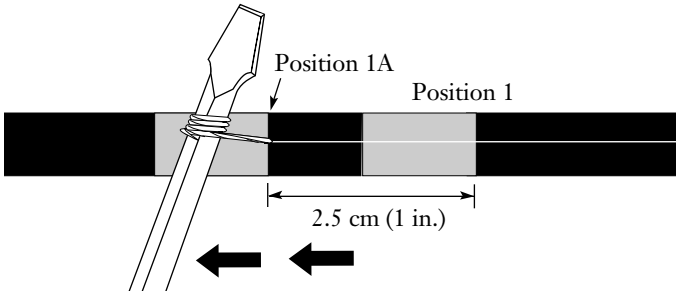



Figure 20

**6.11** Repeat steps 6.9 and 6.10 with the remaining rip cord.

**6.12** Cut the rip cords flush at the Position 1A tape mark with scissors.

**6.13** Starting at the end of the cable, pull ("banana peel") the outer sheath back over and away from the cable end, back to the Position 1 ring cut (Figure 21).

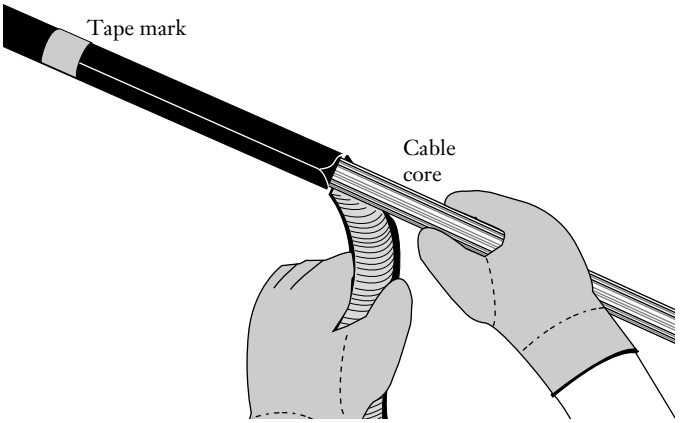



Figure 21

**6.14** Break off the split outer sheath and armor at the Position 1 ring cut (Figure 22).

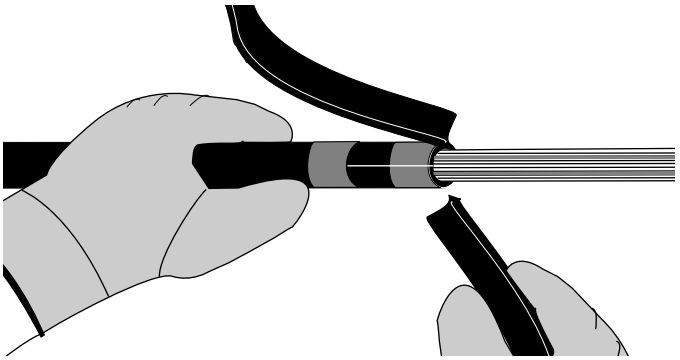


Figure 22

## 7. Accessing ALTOS Cable Cores

**7.1** Starting near the tape mark, pull the yarn away from the cable core until the core is exposed for a length of 15 cm (6 in.) (Figure 23).

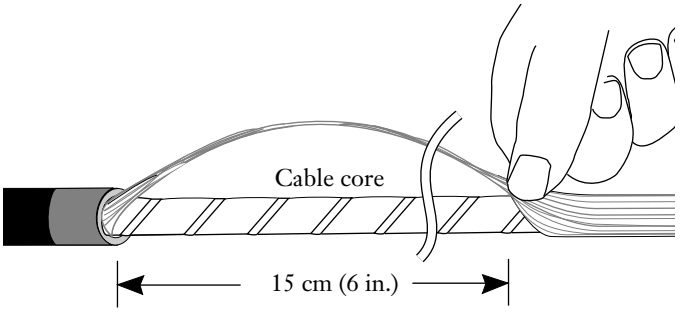



Figure 23

**7.2** Cut the yarn at the 15 cm (6 in.) point with a pair of scissors (Figure 24). Fold the 15 cm (6 in.) length of yarn back out of the way.

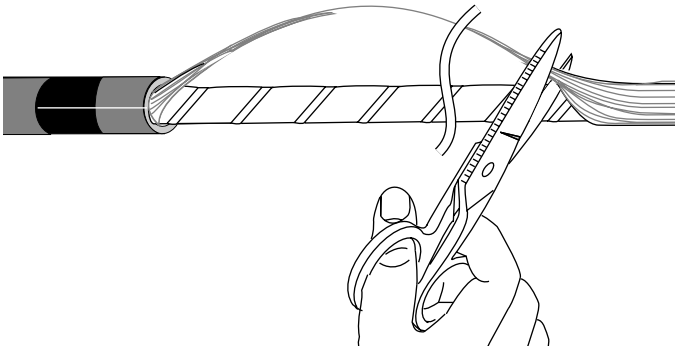


Figure 24

**7.3** Starting at the cut point, slide the yarn off the end of the cable (Figure 25). The yarn will bunch up, but will slide to the end of the cable.

USE CARE TO PREVENT ANY DAMAGE TO THE BUFFER TUBES. ALWAYS SLIDE THE YARN AWAY FROM THE CABLE'S ANCHOR POINT.

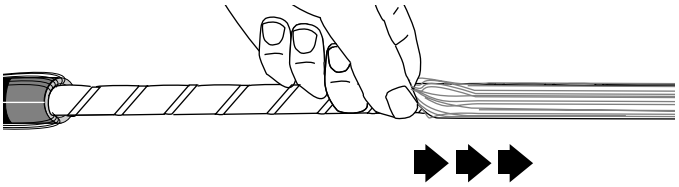


Figure 25

**7.4** Use a seam ripper every 5 cm (2 in.) to cut the single binding tape that secures the water blocking tape to the cable core. USE EXTREME CAUTION to prevent buffer tube damage (Figure 26).

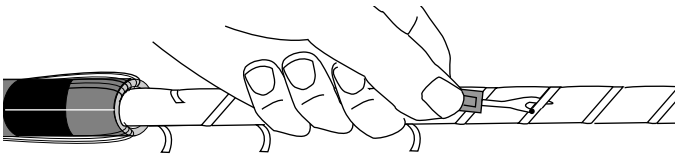


Figure 26

**7.5** Starting at the tape mark, slide the binder tape to the end of the cable core. Slide the tape off the cable.

**7.6** Separate the water blocking tape from the cable core (Figure 27). Use scissors to cut the water-blocking tape flush with the end of the cable sheath.

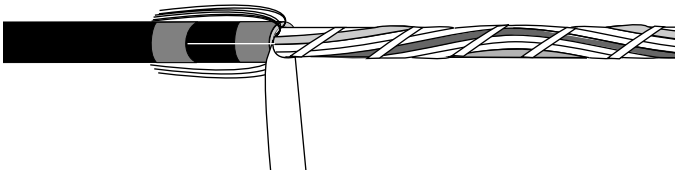


Figure 27

**7.7** Use a seam ripper every 5 cm (2 in. ) to cut the binding tape(s) that secures the buffer tubes to the dielectric central member. USE EXTREME CAUTION to prevent buffer tube damage (Figure 28).

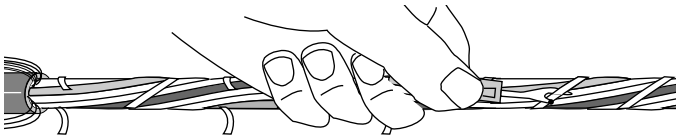


Figure 28

**7.8** Starting at the tape mark, slide the binder tape off the end of the cable. USE CARE TO PREVENT ANY DAMAGE TO THE BUFFER TUBES.

**7.9** Separate the buffer tubes as follows:

a) Working from the end of the cable back to the Position 1 tape mark, carefully unwind the buffer tubes from around the central member of the cable (Figure 29). Use the buffer tube switchback points to assist in unwinding. Be careful not to bend or kink any of the buffer tubes.

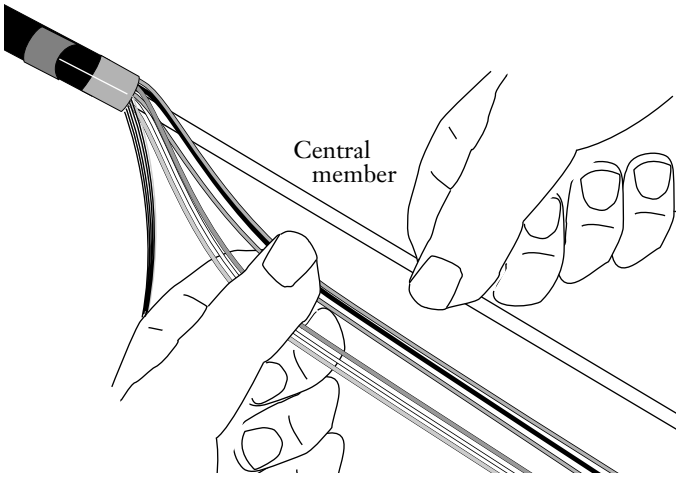



Figure 29

b) Examine each buffer tube for damage.

*If you find any damaged tubes, report the damage to your supervisor. Do not cut out a damaged section or continue the installation with damaged fibers.*

c) Using scissors, cut the water blocking yarn flush with the end of the cable sheath.

**Note:** *During cable sheath removal, the central member length is intentionally cut long for ease of installation into various types of hardware. The central member should be trimmed after installation into the hardware strain relief. For hardware located in an outside plant environment, the exposed central member length should not exceed 6.5 cm (2.6 in.) from the end of the cable sheath.*

**CAUTION:** U*se extreme care when cutting or stripping coating from central members to prevent damage to the buffer tubes. WEAR EYE PROTECTION WHENEVER YOU CUT A CENTRAL MEMBER. Hold the portion of the central member which will be cut from the cable to prevent it from causing possible injuries.*

**7.10** Use side cutters to cut the dielectric central member to a length of 15 mm (6 in.) (Figure 30).

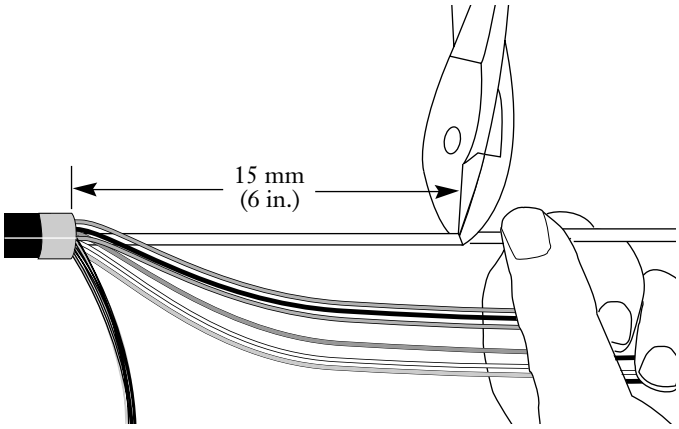



Figure 30

## 8. Grounding the Cable

**8.1** Install the recommended grounding clamp and approved grounding braids or wires to the cable shield and wrap with vinyl tape.

**8.2** To ground the armor with an alligator clip:

a) Carefully pry up the armor and sheath so that the base plate of the grounding clamp can be slid under the armor.

b) Slide the base plate under the armor. Be careful not to damage the buffer tubes. Place the top plate over the base plate and tighten down with its lock nut (Figure 31). A few light taps on the top plate may help seat the teeth of the grounding clamp.

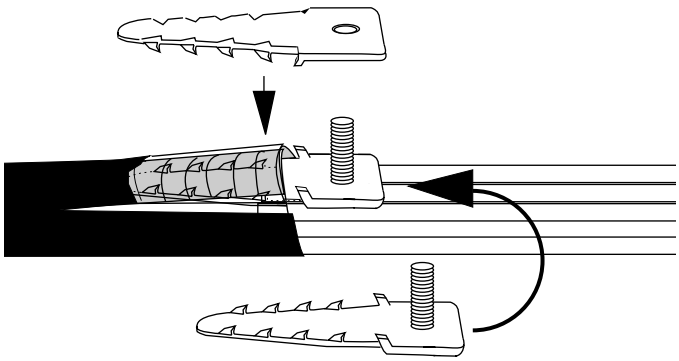


Figure 31

c) Place the grounding braid on top of the lock nut and secure with a second lock nut.

d) Cover the grounding clamp and split portion of the sheath with vinyl tape (Figure 32).

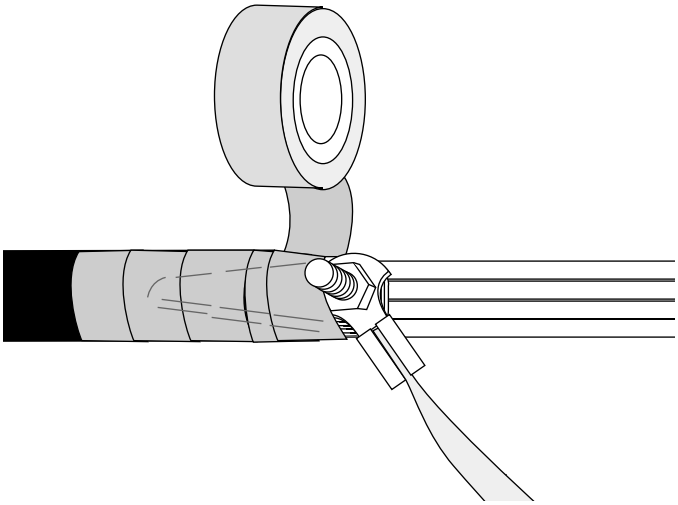


Figure 32

## 9. Accessing the Optical Fibers

**9.1** Use an Ideal coaxial cable stripper to score the buffer tubes. Scoring the circumference of the tube will enable you to make a clean break in the tube with minimal risk to the fibers inside.

Before using the stripper, make sure that it is properly adjusted. Use a small screwdriver to adjust *one* of the blades on the side of the buffer tube cutter so that it seats against the lower jaw but does not force the jaw open (Figure 33).

*Leave the blades on the front and other side of the tool fully retracted so that they do not extend into the grooves of the lower jaw.*

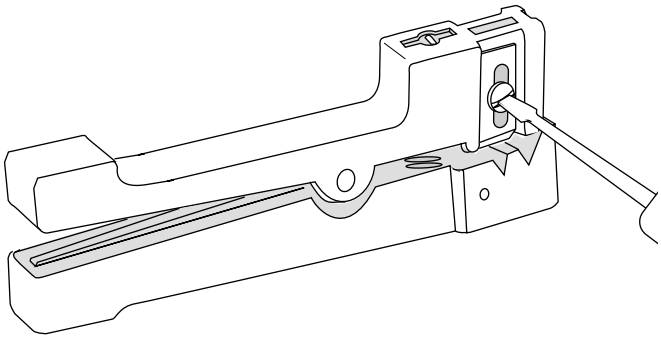


Figure 33

**9.2** Use the last 2 to 3 inches (5 to 7.5 cm) at the end of the cable end to determine the sharpness of the stripper's blade and how many turns of the tool will be required to score the tube.

*To minimize damage to the fibers inside the tube, always use the tool to score the tube,* ***not*** *ring cut it.*

**9.3** To score a buffer tube:

a) Open the tool by squeezing its handles together and place the stripper's blade on the buffer tube at the desired scoring point.

b) Hold the buffer tube steady with one hand to prevent it from twisting.

c) Use your other hand to rotate the tool around the buffer tube two to three complete turns to score it (Figure 34). Remove the tool from the buffer tube.

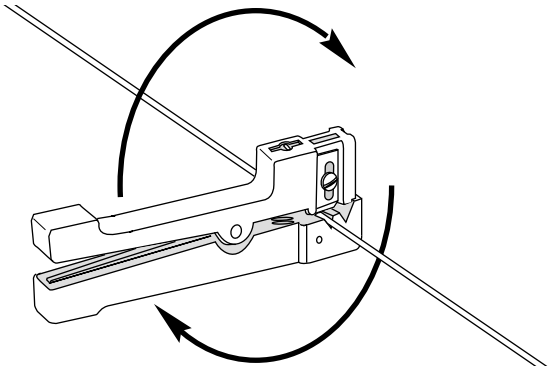


Figure 34

If the stripper completely cuts through the tube during this trial step, move the tool to a new trial area at the end of the buffer tube and repeat a) through c) with fewer rotations in step c). If the blade cuts completely though the tube, damage to the fibers inside can result.

d) Carefully flex the tube to break it at the score point. The break should be clean and free of rough edges (Figure 35). Carefully slide the severed section of buffer tube off of the fibers.

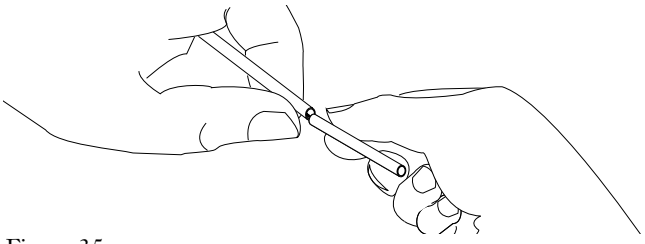


Figure 35

*If the break is not clean, repeat the trial at a new location at the end of the tube with an additional rotation or two.*

**9.4** Once you have determined the number of rotations needed to score the tube, place the tool at the actual score point and carefully repeat steps 9.3 a) through d).

**9.5** If the buffer tube is Gel-free, carefully cut out the water block yarns and proceed to step 10.1. If filling compound is present, use a Fiber-Clean wipe to clean the fibers. Use a dry tissue for final cleaning.

## 10. Hardware Placement

**10.1** Route and secure the cable into the selected termination or splice hardware, following all hardware instructions and procedures. BE EXTREMELY CAREFUL NOT TO DAMAGE THE EXPOSED FIBERS DURING THIS STEP.

**10.2** Terminate or splice the individual fibers according to the appropriate procedures.

*Special Note: Fiber Optic Training Programs*

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