

## **ARMORED CABLE SPLICING**

<b>Revision</b>	<b>Date</b>	<b>Paragraph</b>	<b>Description</b>	<b>Changed By</b>
1	5/11/09		Original Issue	Don Snyder
2	10/26/12	2-5	Updated part numbers and clarify procedure	Don Snyder

### 1. PURPOSE

This procedure describes the method for splicing 3 mm diameter metallic armored cable to 3 mm diameter metallic armored cable.

### 2. SPECIAL EQUIPMENT

<u>Equipment Name</u>	<u>Description</u>	
2.1 High Speed hand held Motor with cutoff wheel		
2.2 Abrasive Cutoff Wheel	Diamond plated 22mm diameter	C00289
2.3 Vise		
2.4 Fusion Splicer		
2.5 Fiber Cleaver		
2.6 Crimp Tool	Orange Handled with .128 Hex Crimp	FIS #F13227
2.7 Heat Gun		
2.8 Buffered Fiber Strip Tool	250μ and 900μ Stripper	FIS #46107
2.9 Permanent Marker	Red	
2.10 Paint Marker	Silver	
2.11 150 mm Rule		
2.12 Scissors – Yellow	Kevlar Cutter	FIS #F1KS1
2.13 Shears	Heavy Duty cable shears	McMaster #3563A71
2.14 Wire Stripper	Squeeze and Strip Insulation Stripper	C00351

### 3. MATERIALS AND SUPPLIES

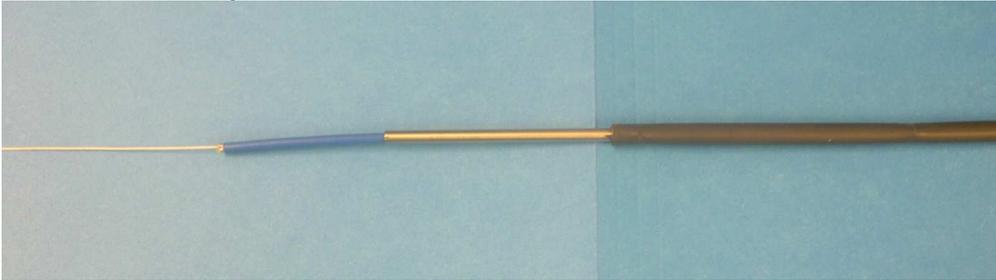
<u>Item Name</u>	<u>Item Description</u>	<u>Part ID #</u>
3.1 MOI Cable	3.0 mm Metallic	222545 or 223367
3.2 Butane Lighter	BIC Electronic lighter	C00331
3.3 Alcohol	Dispensed in push top bottle	C00110
3.4 Texwipes	4x4 lint free optical wipes	C00024
3.5 Fusion Splice Sleeve	40 mm long	220133
3.6 SS Tubing	.135" ID by .165" OD x 8 inches	222667
3.7 Heat Shrink Tubing	7/32" OD, 4:1 shrink, Adhesive Lined	222564

#### 4. SETUP

- 4.1 Verify that all testing is complete and that it has passed the customers' requirements.
- 4.2 Check for final packaging requirements.
- 4.3 Check that the minimum cable diameter is 2.8mm or greater.
- 4.4 Check for length of armored cable required and distance from sensor to armored cable.
- 4.5 Check for type of armored cable, regular - blue or black – high temperature
- 4.6 Stripping Fiber
  - 4.6.1 Stripping Polyimide coated fiber – Char coating in area to be stripped and wipe clean with alcohol and Texwipe.
  - 4.6.2 Stripping acrylate coated fiber – Use fiber stripper to mechanically remove the coating and wipe clean with a Texwipe and alcohol.

#### 5. OPERATION

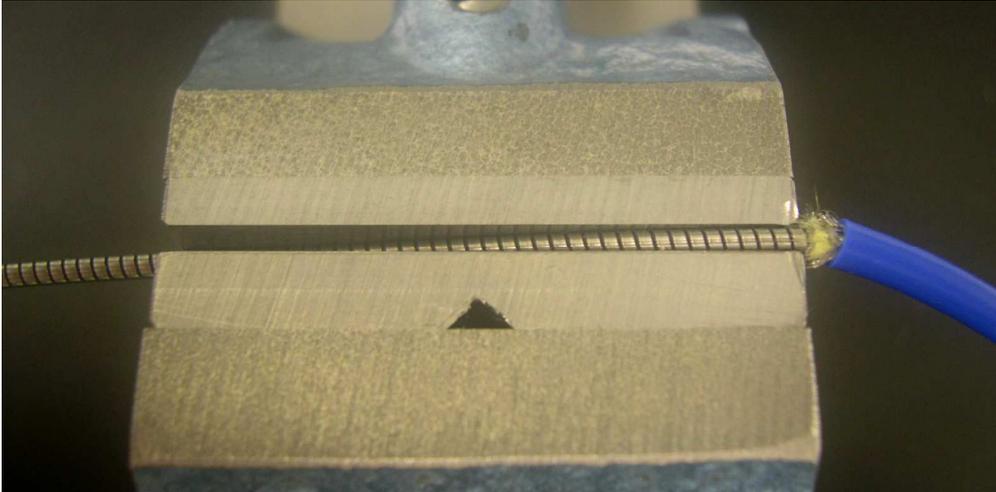
- 5.1 Cut desired length of armored cable.
- 5.2 Cut Heat Shrink tubing to 240 mm length.
- 5.3 Slide heat shrink tubing over cable then slide SS tube over cable. Can be slid over either end of cable.



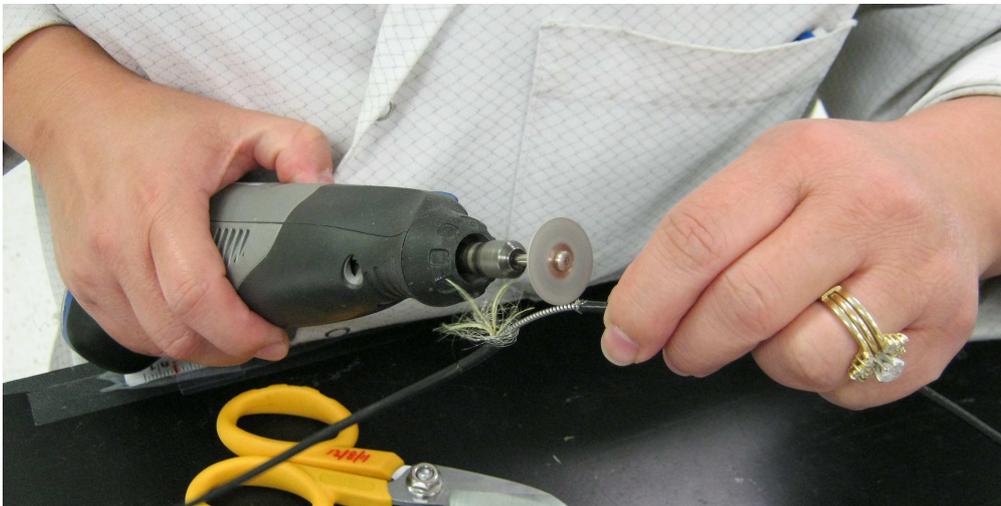
- 5.4 Prepare Armored Cable End 1 – Short End – Fiber already in cable – Skip to step 5.3.5 if fiber is already exposed. – See section 5.8 for drawing of length requirements.
  - 5.4.1 Mark armored cable end 85 mm from end.
  - 5.4.2 Use jacket stripper to remove jacket from a small section of cable



- 5.4.3 Cut wires and Kevlar as close to jacket as possible using yellow handled scissors.
- 5.4.4 Clamp core tube in vise and cut as close as possible to cable jacket using abrasive cutoff wheel. Do not let the core tube get hot as it will damage the buffer on the fiber.



- 5.4.5 Alternative method is to cut spiral steel wire as shown below. Be careful to not damage the fiber with heat.

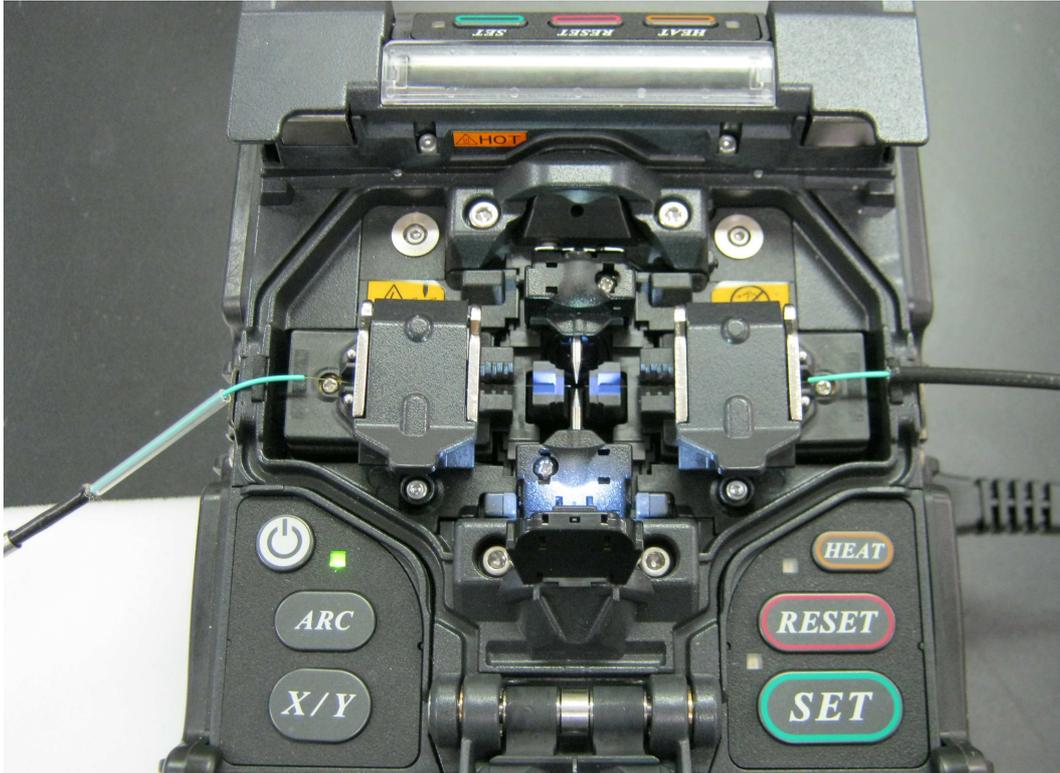


- 5.4.6 If using polyimide fiber in armored cable, insert 125mm long piece of aqua colored buffer tube (p/n 220299) into end of armored cable.
- 5.4.7 Lightly push fiber into cable and release.
- 5.4.8 Mark fiber (buffer) 52 mm from end of cable.
- 5.4.9 If using Polyimide fiber, cut a 125mm piece of buffer tubing and insert over fiber.
- 5.4.10 Strip fiber (buffer) to mark and wipe fiber with alcohol.
- 5.4.11 Place fiber in cleaver with buffer at the 18 mm location, cleave fiber and load in fusion splicer. (Note that the fiber can be cleaved to as close as 42 mm from the end of the armored cable and still be able to splice it.)
- 5.5 Prepare Cable End 2 – Long End - Fiber already in cable. – See section 5.8 for drawing of length requirements.
- 5.5.1 Mark armored cable end 125 mm from end. Follow steps 5.4.2 through 5.4.7 to remove armored cable jacket.
- 5.5.2 Slide splice sleeve over fiber.

- 5.5.3 Lightly push buffered fiber into cable and release.
- 5.5.4 If using Polyimide fiber, cut a 125mm piece of buffer tubing and insert over fiber.
- 5.5.5 Mark fiber 92 mm from end of cable.
- 5.5.6 Strip fiber to mark and wipe fiber with alcohol.
- 5.5.7 Place fiber in cleaver with the mark at the 18 mm location, cleave fiber and load in fusion splicer.

## 5.6 Fusion Splice Fibers

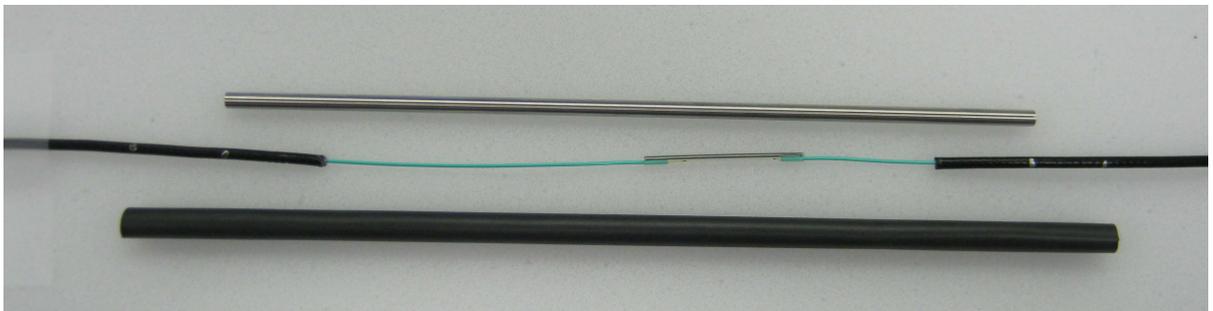
- 5.6.1 Splice fibers.



- 5.6.2 Remove fiber and center splice sleeve over bare fiber, place in heater and heat. Be careful that splice sleeve overlaps both ends of buffer.

## 5.7 Attach SS Tubing

- 5.7.1 Mark each cable for the stainless steel tubing location by centering the splice tube over the splice area and mark as shown. Repeat for the heat shrink tubing.



- 5.7.2 Slide SS tubing over cable and splice sleeve and align end with the 10 mm mark.

- 5.7.3 Align the tubing with the marks and crimp tubing onto jacket using the orange handled crimp tool with .128" hex crimp. This is the hex shaped die closest to the jaw pivot point. See photo below.



- 5.7.4 The finished crimp should look as shown below. Pull on cable to insure a strong bond. Cables with a diameter below 2.8 mm will not hold the 25 pound minimum pullout force.



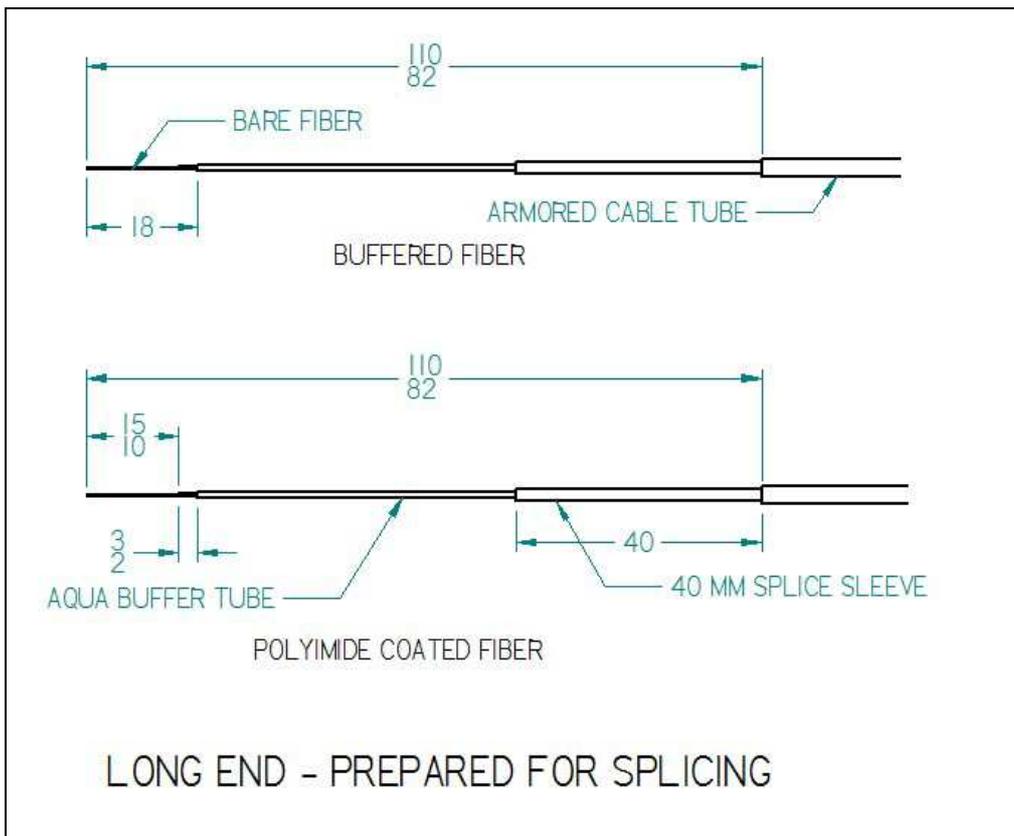
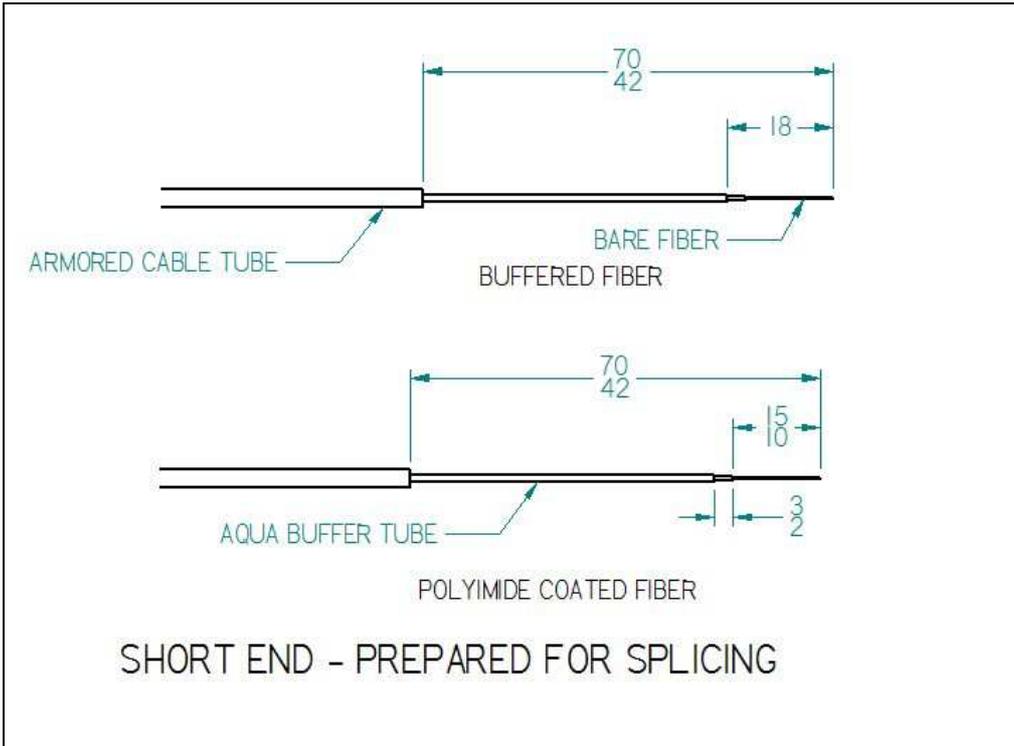
- 5.7.5 Slide the heat shrink tubing over the SS tubing and center over the marks. The tubing should cover both marks.
- 5.7.6 Shrink with the heat gun starting with the center first.



5.7.7 The finished product should look as follows.



5.8 Fiber End Prep Dimensions – The following two sketches below show the dimensional limits for the length of the fiber, the strip length range and the position of the aqua buffer tube. The minimum fiber lengths are necessary for splicing on the Fujikura FMS-60S fusion splicer.



**NOTE:** Sections 6 thru 12 are not applicable to this procedure and are intentionally left out.