

# HVS-T-3580S 35kV Class

Trifurcating Transition Splice for 3/C PILC to 3-1/C Extruded Dielectric (Poly/EPR) Power Cables

## ENERGY DIVISION

### Suggested Installation Equipment (not supplied with kit)

- Cable preparation tools
- Tyco Electronics P63 cable preparation kit or cable manufacturer approved solvent
- Clean, lint-free cloths
- Non-conducting abrasive cloth, 120 grit or finer
- Electrician's tape
- Connector(s) and installation tools
- Tyco Electronics recommended torch

### Safety Instructions

**DANGER:** When installing electrical power system accessories, failure to follow applicable personal safety requirements and written installation instructions could result in fire or explosion and serious or fatal injuries.

To avoid risk of accidental fire or explosion when using gas torches, always check all connections for leaks before igniting the torch and follow the torch manufacturer's safety instructions.

To minimize any effect of fumes produced during installation, always provide good ventilation of confined work spaces.

*As Tyco Electronics has no control over field conditions which influence product installation, it is understood that the user must take this into account and apply his own experience and expertise when installing product.*

### Customer Service

For 24 hour customer service, call 800-327-6996.

### Recommended Tyco Electronics Torches

Install heat-shrinkable cable accessories with a "clean burning" torch, i.e., a propane torch that does not deposit conductive contaminants on the product.

Clean burning torches include the Tyco Electronics FH-2629, FH-2649 (uses refillable propane cylinders) and FH-2618A (uses disposable cylinder).

### Adjusting the Torch

Adjust regulator and torch as required to provide an overall 12-inch bushy flame. The FH-2629 will be all blue, the other torches will have a 3- to 4-inch yellow tip. Use the yellow tip for shrinking.

### Regulator Pressure

FH-2618A	Full pressure
FH-2649	25 psig
FH-2629	15 psig

### Cleaning the Cable

Use an approved solvent, such as the one supplied in the P63 Cable Prep Kit, to clean the cable. Be sure to follow the manufacturer's instructions. Failure to follow these instructions could lead to product failure.

Some newer solvents do not evaporate quickly and need to be removed with a clean, lint-free cloth. Failure to do so could change the volume resistivity of the substrate or leave a residue on the surface. Please follow the manufacturer's instructions carefully.

### General Shrinking Instructions

- Apply outer 3- to 4-inch tip of the flame to heat-shrinkable material with a rapid brushing motion
- Keep flame moving to avoid scorching
- Unless otherwise instructed, start shrinking tube at center, working flame around all sides of the tube to apply uniform heat

To determine if a tube has completely recovered, look for the following, especially on the back and underside of the tube:

1. Uniform wall thickness
2. Conformance to substrate
3. No flat spots or chill marks
4. Visible sealant flow if the tube is coated

**Note:** When installing multiple tubes, make sure that the surface of the last tube is still warm before positioning and shrinking the next tube. If installed tube has cooled, re-heat the entire surface.

# Installation Instructions

## 1. Product selection

Check kit selection with cable diameter dimensions in Table 1.

Table 1

Kit	PILC Cable		Poly Cable			Maximum Connector Dimensions	
	Nominal Cable Range	Insulation Diameter Range	Nominal Cable Range	Maximum Jacket Diameter	Insulation Diameter Range	Length	Diameter
HVS-T-3582S	1/0-350	1.05 - 1.40" (27 - 36mm)	1/0 - 350	1.90" (48mm)	1.05-1.50" (27 - 38mm)	5.0" (127mm)	1.20" (30mm)
HVS-T-3583S	250-750	1.20 - 1.70" (30 - 43mm)	250 - 750	2.10" (53mm)	1.30 - 1.85" (33 - 47mm)	8.0" (203mm)	1.80" (46mm)

## 2. Check ground braid

Verify that ground braid(s) or bond wire have equivalent cross-section to cable metallic shield. Additional braid may be needed for LC shield, lead sheath cables, or if external grounding or shield interrupting is required.

Tyco Electronics HVS-EG supplies ground braid, spring clamp and suggested modifications to make an external ground or shield interrupt.

## 3. Prepare cables

Choose the splice type (Choice 1-5) and follow the directions given.

Table 2	Poly Jacket Cutback A	Poly Semi-con Cutback B	PILC Jacket Cutback C*
HVS-T-3582S	14" (255mm)	8" (203mm)	25" (635mm)
HVS-T-3583S	15" (381mm)	9-1/2" (241mm)	27" (686mm)

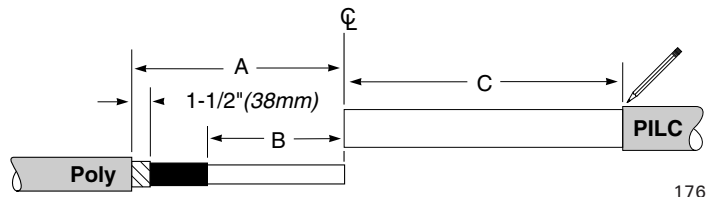
\*Mark PILC cable, if unjacketed.

### CHOICE 1

If PILC to Metallic Tape Shield, Lead Sheath or LC Shield Cable

Refer to Table 2 and prepare the cables as shown.

Go to Step 4, page 3.



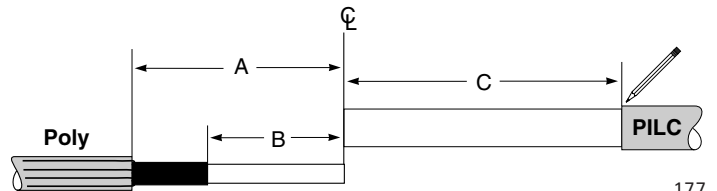
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### CHOICE 2

If PILC to Drain Wire Shield Cable

Refer to Table 2 and prepare the cables as shown.

Go to Step 4, page 3.



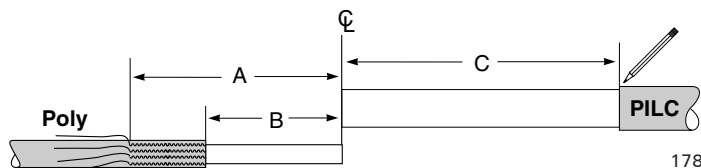
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### CHOICE 3

#### If PILC to UniShield® Cable

Refer to Table 2 and prepare the cables as shown. Pull back the drain wires to Dimension A.

Go to Step 4, below.



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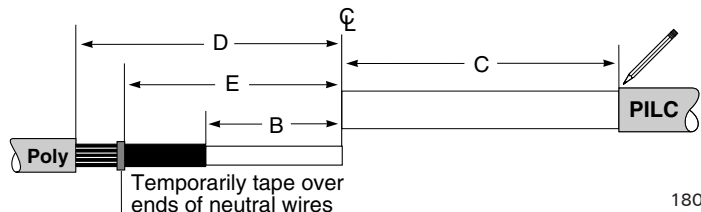
UniShield is a trademark of General Cable Technologies Corporation.

### CHOICE 4

#### If PILC to Jacketed Concentric Neutral Cable

Refer to Table 3 and prepare the cables as shown. Cut neutral wires to dimension E and temporarily tape over ends.

Go to Step 4, below.



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Table 3

Kit	Poly Jacket Cutback D	Poly Wire Cutback E	Poly Semi-con Cutback B	PILC Jacket Cutback C*
HVS-T-3582S	17-1/2"(444mm)	12-1/2"(317mm)	8"(203mm)	25" (635mm)
HVS-T-3583S	19"(483mm)	13-1/2"(343mm)	9-1/2" (241mm)	27" (686mm)

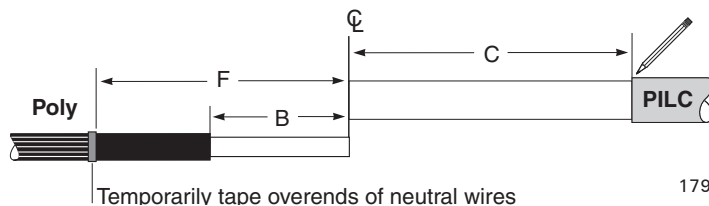
\*Mark PILC cable, if unjacketed.

### CHOICE 5

#### If PILC to Unjacketed Concentric Neutral Cable

Refer to Table 4 and prepare the cables as shown. Cut neutral wires to Dimension F and temporarily tape over ends.

Go to Step 4, below.



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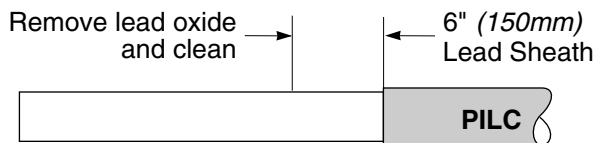
Table 4

Kit	Poly Wire Cutback F	Poly Semi-con Cutback B	PILC Jacket Cutback C*
HVS-T-3582S	16" (406mm)	8" (203mm)	25" (635mm)
HVS-T-3583S	17" (432mm)	9-1/2" (241mm)	27" (686mm)

\*Mark PILC cable, if unjacketed.

#### 4. Prepare lead sheath

Remove lead oxide from the lead sheath and clean with approved solvent.

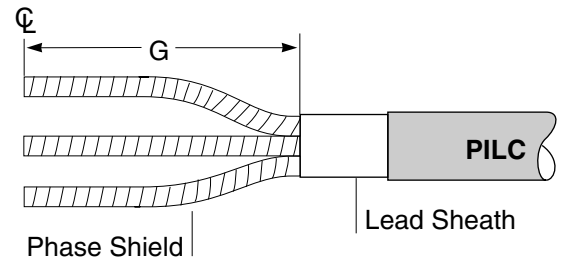


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### 5. Remove lead sheath as shown

**Note for gas pressure cable:** Cut off all gas tubes/ducts and overall shielding tape at the lead sheath cut.

Kit	Lead Sheath Cutback G
HVS-T-3582S	19" (483mm)
HVS-T-3583S	21" (533mm)

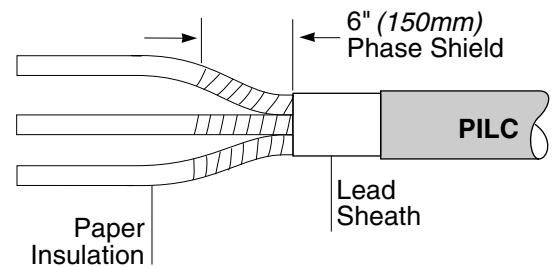


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### 6. Cut back shield

Cut back any bedding and/or shielding tapes over all three phases to lead sheath cutback. Cut back phase shields and remove any conductive material from paper insulation as shown.

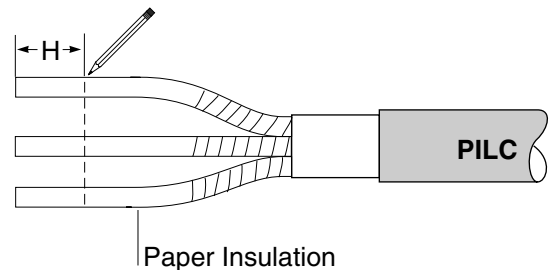
Tack solder metal tape shields to prevent unwrapping and tape over sharp edges with one wrap of electrician's tape.



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### 7. Mark insulation as shown

Kit	H
HVS-T-3582S	4" (102mm)
HVS-T-3583S	5-1/2" (140mm)

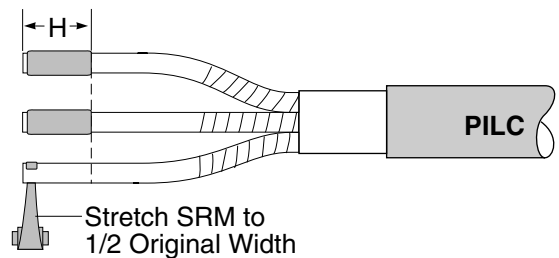


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### 8. Apply Stress Relief Material (SRM)

Remove backing strip from one side of a long strip of SRM. Roll up the SRM and remaining backing strip into a convenient size.

Removing the remaining backing strip, tightly wrap one, half-lapped layer of SRM around each phase as shown. Wrap SRM in same direction as insulating papers on cable.

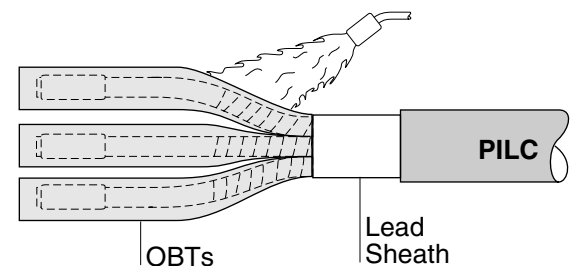


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### 9. Position OBT; shrink in place

Place an Oil Barrier Tube (OBT) over each phase, butted to the lead sheath (or belt paper) cutback. Shrink the three OBTs in place starting at the lead sheath cutback.

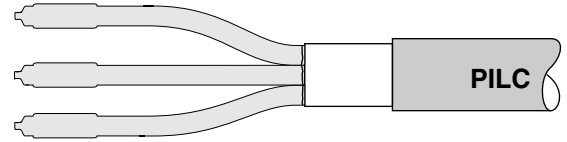
**Note:** To achieve a smooth, wrinkle-free installation, use a reduced flame to install the thin-walled OBT.



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### 10. Inspect OBTs

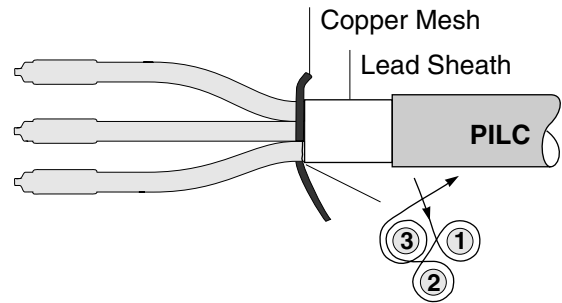
The installed OBTs should have a smooth, wrinkle-free surface after shrinking. Reheat to smooth any wrinkled areas.



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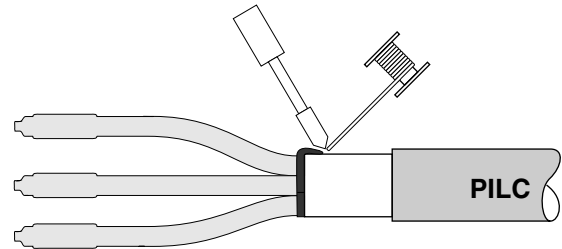
### 11. Install 1" wide copper mesh

Fold the 1 inch (25mm) wide copper mesh in half lengthwise and wind it around each phase shield as closely as possible to the lead sheath cut.



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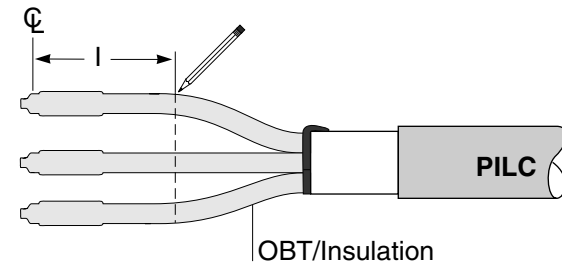
Solder copper mesh to the lead sheath. Cut off excess mesh close to lead sheath.



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### 12. Mark OBT/ Insulation at "I"

Kit	I
HVS-T-3582S	8" (203mm)
HVS-T-3583S	9-1/2" (241mm)

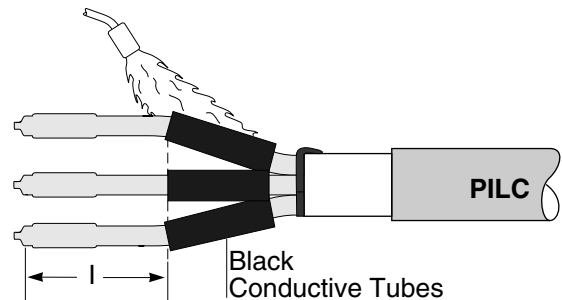


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### 13. Position black conductive tubes; shrink in place

Place black conductive tube over each phase and position at dimension I.

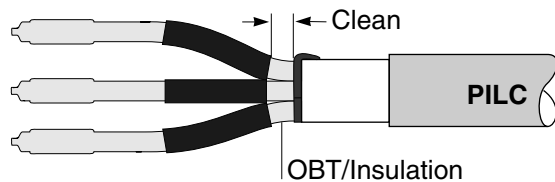
Shrink in place starting at the end nearest to the center of the splice.



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### 14. Clean OBTs

Using an approved solvent, clean the OBT/Insulation as shown.

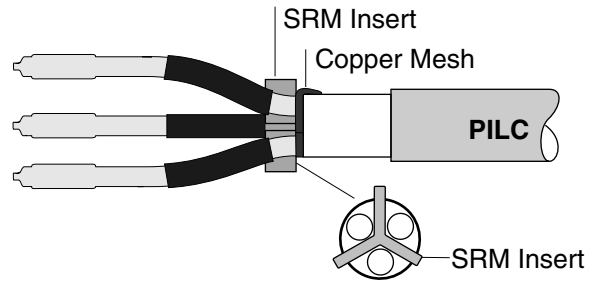


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### 15. Install SRM insert

Assemble SRM insert per box instructions. Spread the phases and position the insert as shown.

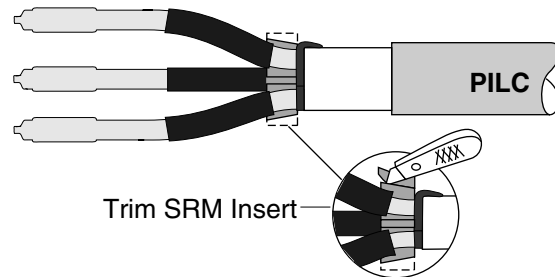
**Note:** The SRM insert is packaged inside the conductive breakout.



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### 16. Trim excess SRM insert

Trim SRM insert to extend 1/8" (3mm) beyond each phase.

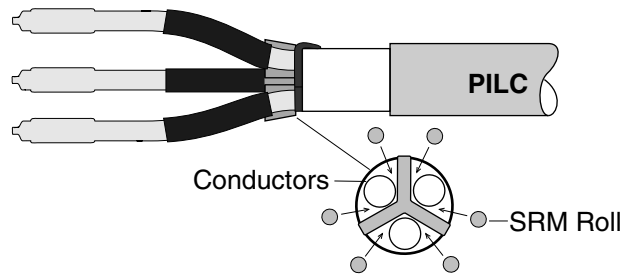


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### 17. Fill gaps between SRM insert and conductors

Cut a 6" (152mm) piece of SRM into six 1" (25mm) strips. Remove the backings and roll up each 1" piece.

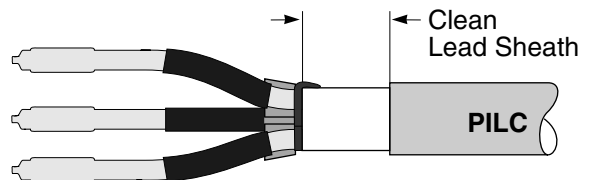
Place two of the SRM rolls on each side of the SRM insert to fill the gaps between the insert and the conductors as shown.



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### 18. Clean lead sheath

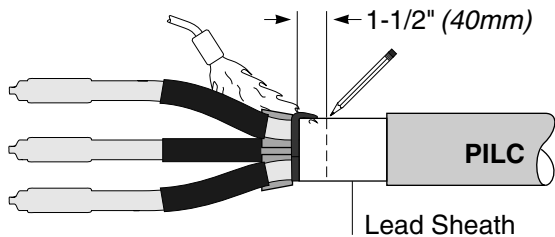
Reclean lead sheath as shown using an approved solvent.



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### 19. Mark lead sheath as shown

**Note:** To ensure SRM to OBT adhesion, gently heat the SRM insert and adjacent OBT before moving on to the next step.

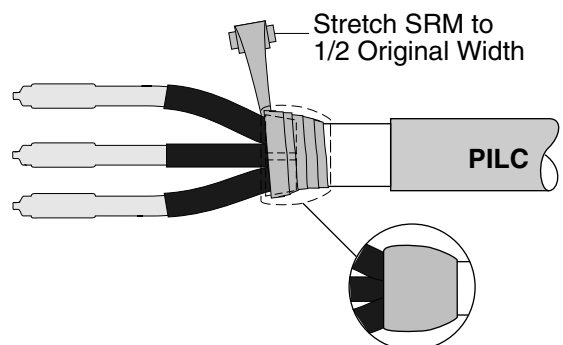


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### 20. Install oil seal

Remove backing from one side of a long strip of SRM. Roll the SRM and remaining backing strip into a convenient size. Removing the remaining backing strip, tightly wrap the SRM from the mark on the lead sheath to the outer edge of the SRM insert. Four to six strips of SRM should be used to build the SRM to the shape shown.

**Note:** Do not over apply. The finished SRM diameter should not exceed that of the breakout installed in the next step.

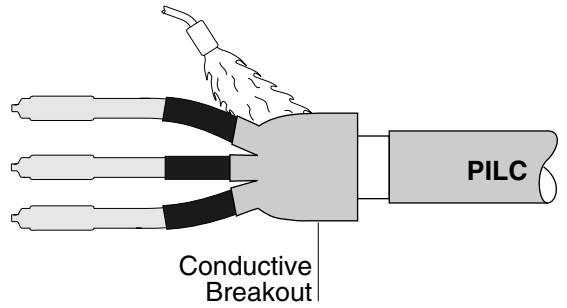


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**21. Position conductive breakout; shrink in place**

Position the conductive breakout over the SRM so that the inside butts up hard against the SRM.

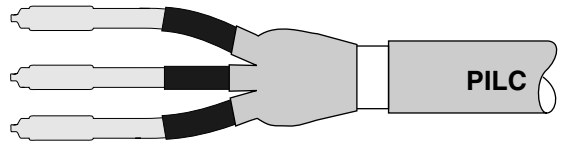
Shrink in place starting at the fingers and working toward the other end.



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**22. Inspect breakout**

After the breakout has shrunk, continue to apply heat until the breakout has a smooth, uniform surface.



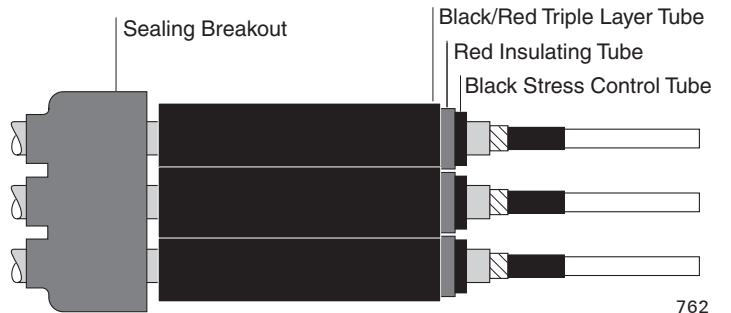
360

**23. Position splice components**

Abrade insulation, if necessary, to remove imbedded semi-con. Clean Poly cable jackets for 30" (760mm).

Place sealing breakout over the Poly cables with the fingers pointing away from the splice center.

Place one set of nested tubes over each clean Poly cable.

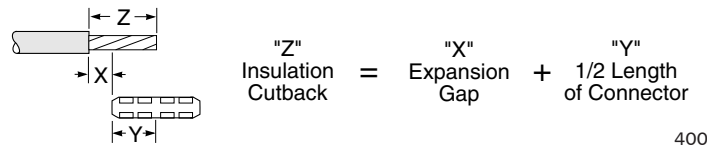


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**24. Remove insulation**

Refer to Table 5 and cutback the insulation as shown.

**Note:** If crimping, make sure connector has center oil stop.



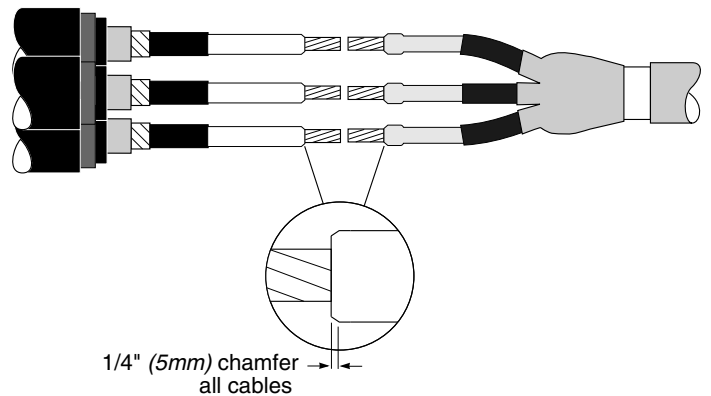
400

**Table 5**

Kit	Connector Dimensions		Expansion Gap "X"
	Max Length	Max O.D.	
HVS-T-3582S	5" (127mm)	1.20" (30mm)	1/2" (10mm)
HVS-T-3583S	8" (203mm)	1.60" (46mm)	1/2" (10mm)

**25. Chamfer insulation**

Chamfer insulation for 1/4" (5mm) as shown.



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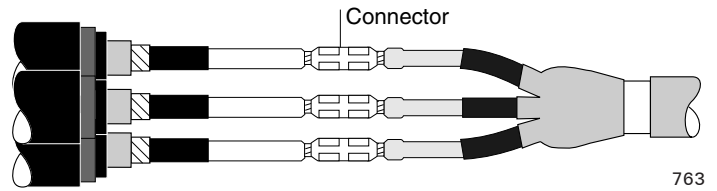
## 26. Install connectors

Note: Tyco Electronics recommends the use of connectors with rounded or "tapered" ends, but they are not required.

If soldering, protect OBT by wrapping it with cotton or glass fiber tape

After installation, deburr connections.

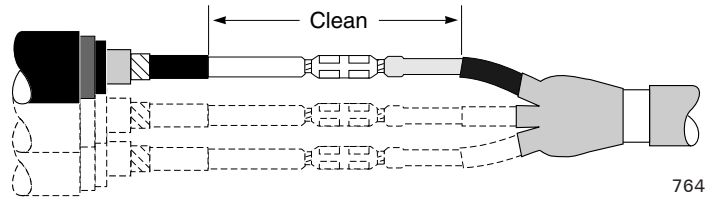
**Note:** A Poly tape shield to PILC splice is shown in this instruction as an example. Any cable combination discussed earlier can be used.



## 27. Clean connector area

Complete Steps 27-31 working on one phase at a time.

Using an oil-free solvent, clean the insulation as shown, paying particular attention to the OBT/insulation surface.



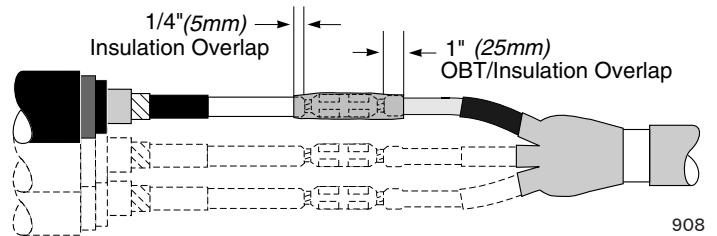
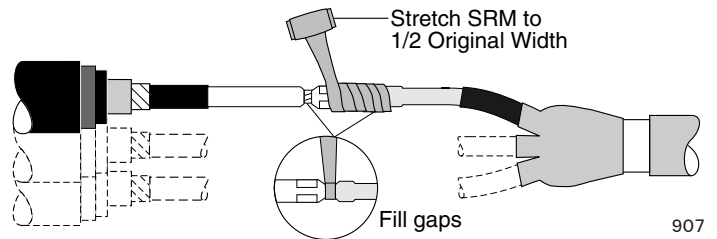
## 28. Apply SRM over connector

Remove backing from one side of a long strip of SRM. Roll the SRM and remaining backing strip into a convenient size. Removing the remaining backing strip, tightly wrap the SRM around the connector and exposed conductor. Be sure to fill the gaps and low spots around the connector.

Continue to wrap the SRM onto the insulation as shown.

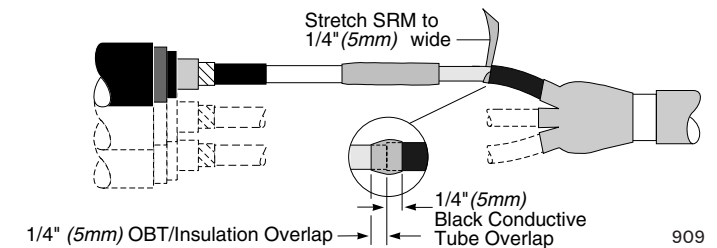
Make sure the area between the connector end and the end of the insulation is filled in up to the top of the chamfered insulation.

**Note:** If the connector diameter is larger than the insulation diameter, apply two half-lapped layers of SRM over the entire connector. Discard any excess SRM (long strips).



## 29. Apply SRM at black conductive tube step

Remove backings from the short angle-cut piece of SRM. Place tip of SRM at black conductive tube step and tightly wrap to fill the step. Overlap black conductive tube and OBT/Insulation and taper down to meet OBT/Insulation as shown.



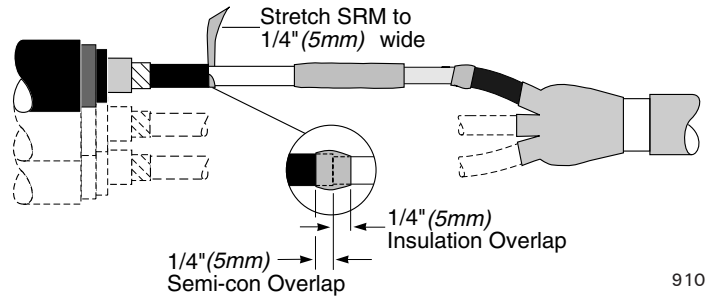


**30. Apply SRM at semi-con cutback; apply Discharge Control Compound (DCC)**

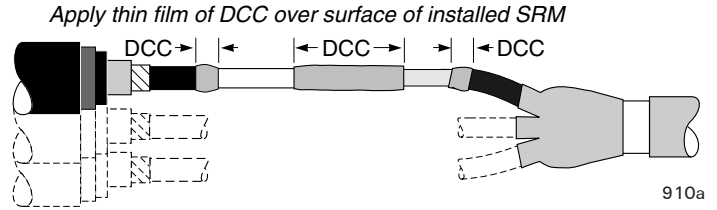
Remove backings from the short angle-cut piece of SRM. Place tip of SRM at semi-con step and tightly wrap to fill the step. Overlap semi-con and insulation and taper down to meet insulation as shown. Apply a thin film of silicone grease over the applied SRM.

**Note:** If using UniShield cable, apply SRM as shown to fill conductive jacket step.

Snip open the end of the DCC ampule and apply a thin film of compound on the SRM over the connector and semi-con steps.



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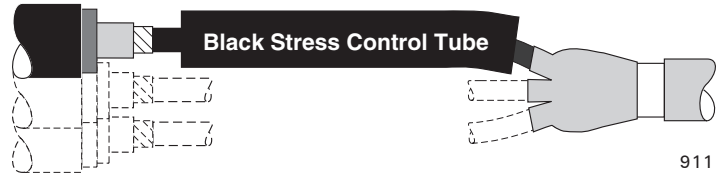


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**31. Position black stress control tube**

Center black stress control tube over the completed connector area. Be sure to equally overlap the Poly cable semi-con and the PILC cable black conductive tube.

**Repeat Steps 27-31 for the remaining phases.**



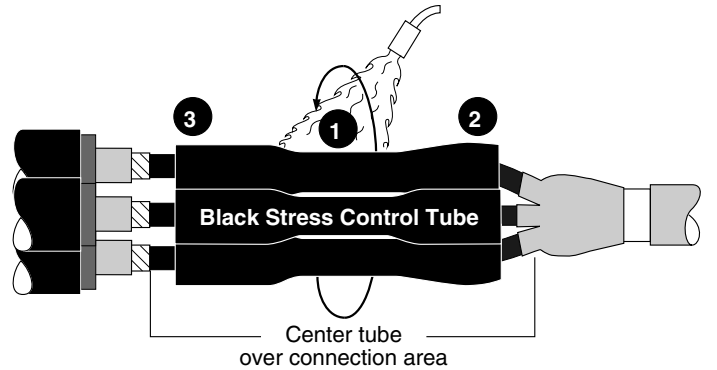
911

**32. Check position of black stress control tubes; shrink in place**

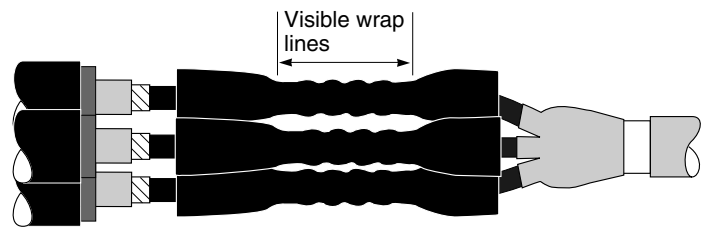
Make sure each tube is centered over the connection area, equally overlapping the semi-con (Poly side) and black conductive tube (PILC side). Shrink all three tubes in place at the same time.

Begin shrinking at center of tubes (1), working torch with a smooth brushing motion around the tubes. After center portions shrink, work torch as before toward one end (2), then to the opposite end (3).

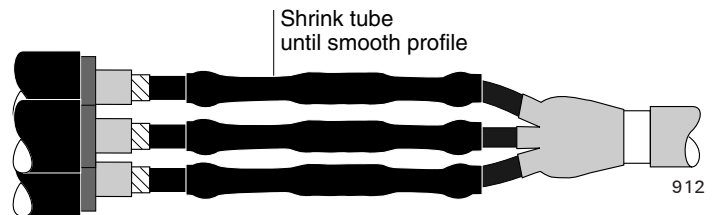
**Note:** Do not point the flame at the cable semi-con.



The rings from the SRM wraps may be visible as the tubing is shrunk.



Post heat the connector area until the tube surface is smooth and the underlying SRM wraps are no longer visible.

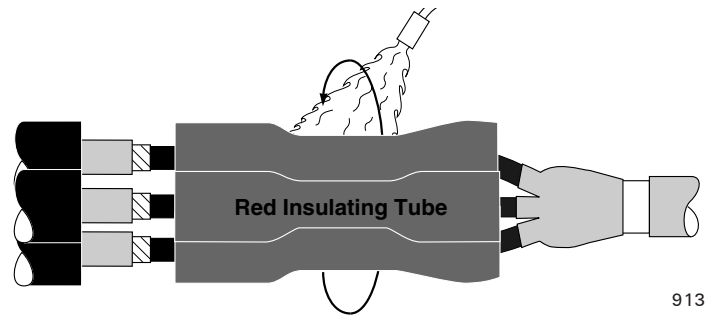


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### 33. Position red insulating tubes; shrink in place

**Note:** Steps 33-35 must be completed without stopping. Do not allow the red insulating tubes to cool before applying the red sealant and installing the black/red triple layer tubes.

Center red insulating tubes over the black stress control tubes. Shrink in place using the same method as in Step 31.



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### 34. Apply red sealant

Remove backing from red sealant. Using light tension, wrap sealant over the cable, butted against the red insulating tube as shown. Build the sealant to the level of the red insulating tube.

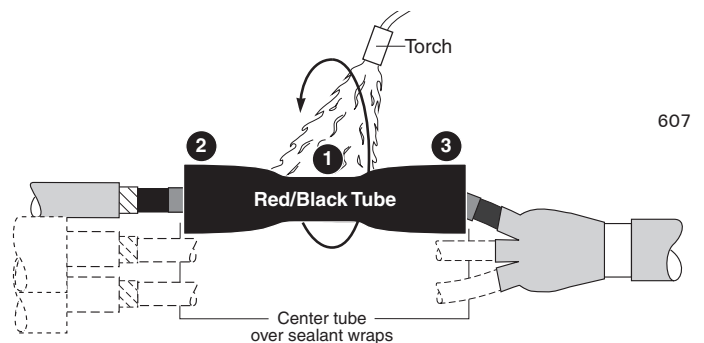


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### 35. Position black/red triple layer tubes: Shrink all 3 in place at the same time

Center the black/red tubes over the sealant wraps (there should be about 1.0" of sealant exposed from the ends of the tubes). Begin shrinking the center (1) of the tubes, working the torch around all sides of the tubes. After the center portion shrinks, work toward one end (2) then to the opposite end (3).

Do not point the flame at the cable semi-con.



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### If External Grounding or Shield Interrupting

Refer to the Tyco Electronics HVS-EG, "Guide for External Grounding and Shield Interrupting of Power Cable Splices" for modifications to these instructions.

### 36. Install ground

Choose the appropriate cable type (Choice 1-5) and follow the directions given to ground each phase.

#### Choice 1

If Drain Wire or UniShield cable go to page 11.

#### Choice 2

If Metallic Tape or LC Shield cable go to page 11.

#### Choice 3

If Lead Sheath cable go to page 11.

#### Choice 4

If Jacketed Concentric Neutral cable go to page 11.

#### Choice 5

If Unjacketed Concentric Neutral cable go to page 13, step 43.

### Choice 1

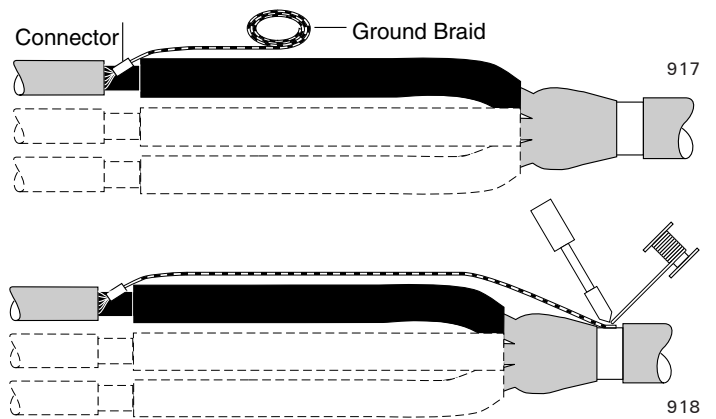
#### If Drain Wire or UniShield Cable

Pigtail the shield wires and crimp on to the ground braid using the connectors provided.

Lay the braids across the splice tubes and solder ground braids to the lead sheath of the PILC cable. Deburr the connection, cut off excess braid, and trim pigtailed wires.

Discard spring clamps and foil tapes.

**Go to Step 37, page 12.**



### Choice 2

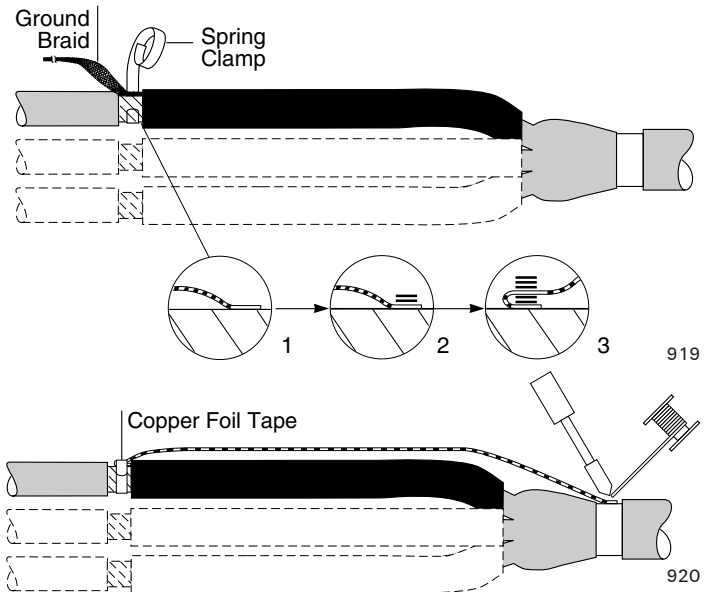
#### If Metallic Tape or LC Shield Cable

(1) Flare one end of the ground braid and place it onto the metallic tape, butted up to the red sealant. (2) Attach the braid to the shield by placing two wraps of the spring clamp over the braid. (3) Fold the braid back over the spring clamp wraps. Continue to wrap the remaining clamp over the braid. Tighten clamp by twisting it in the direction it is wrapped and secure with copper foil tape provided.

Lay the braids across the splice tubes and solder ground braids to the lead sheath of the PILC cable. Deburr the connection, cut off excess braid, and trim pigtailed wires.

Discard drain wire connectors.

**Go to Step 37, page 12.**



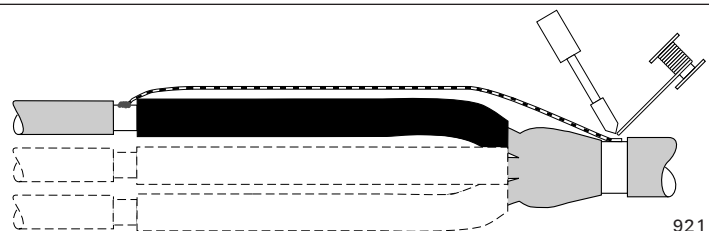
### Choice 3

#### If Lead Sheath Cable

Solder ground braids onto lead sheath. Lay the braids across the splice tubes and solder to the lead sheath of the other side. Deburr the connection and cut off excess braid.

Discard spring clamps, drain wire connectors, and foil tapes.

**Go to Step 37, page 12.**



### Choice 4

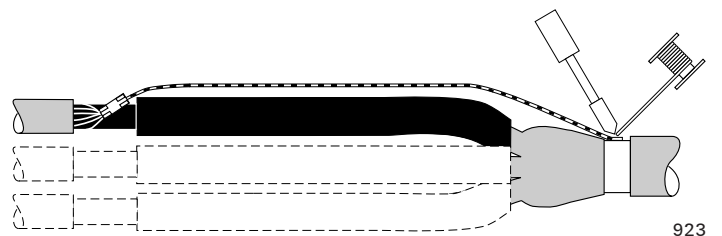
#### If Jacketed Concentric Neutral Cable

Pigtail the neutral wires and crimp or solder to the ground braid.

Lay the braids across the splice tubes and solder ground braids to the lead sheath of the PILC cable. Deburr the connection, cut off excess braid, and trim pigtailed wires.

Discard spring clamps, drain wire connectors, and foil tapes.

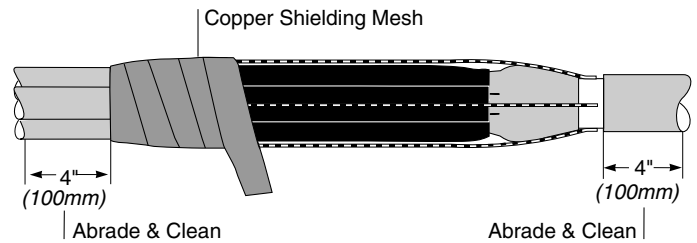
**Go to Step 37, page 12.**



### 37. Apply shielding mesh

Starting over the ground connections on the extruded dielectric side of the splice, wrap one half-lapped layer of 2 inch (50mm) wide shielding mesh across the splice and solder to the PILC cable lead sheath.

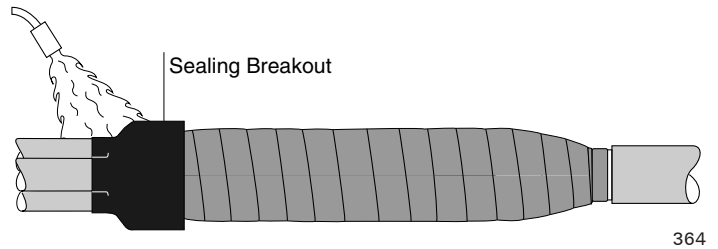
Abrade and solvent clean cable jackets (or lead sheath) as shown using an approved solvent.



### 38. Position non-conductive sealing breakout; shrink in place

Make sure that the full length of the fingers of the breakout are over the extruded dielectric cable jackets with the body extending over the splices.

Shrink in place starting at the fingers and working toward the splice center.

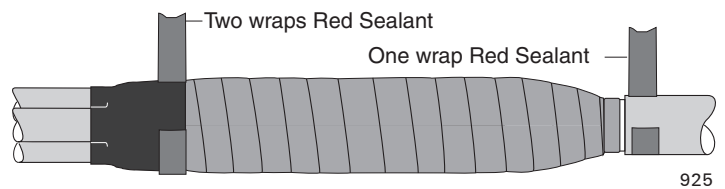


### 39. Apply red sealant

Allow breakout to cool sufficiently to touch before proceeding.

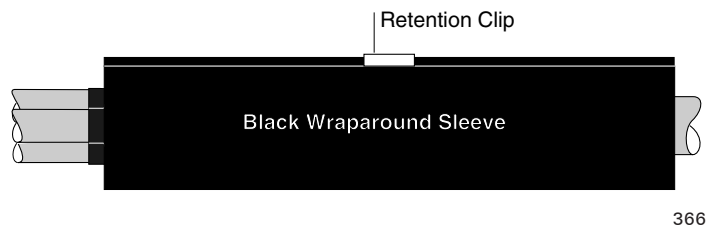
Apply two wraps of red sealant over the body of the breakout as shown.

Apply one wrap of red sealant over PILC outer sheath as shown.



### 40. Position wraparound sleeve

Remove or tape over all sharp points to prevent puncture of wraparound sleeve. Remove backing from wraparound sealing sleeve and center sleeve over splice. Slide metal channel onto the butted rails.



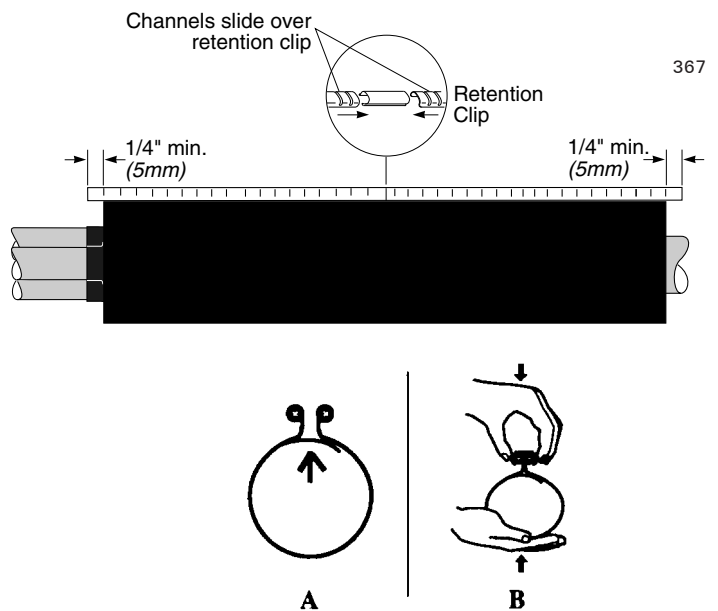
### 41. Install channels

Slide channels onto the rail. Connect the channels by having them overlap the retention clip as shown at right.

**Note:** Channels must overlap sleeve edge by 1/4 inch minimum.

If channels slide on easily go to step 42. If channel fit seems tight, continue with next paragraph.

As shown in illustration A, make sure flap is not pinched between the rails. Push the sleeve up from the bottom and down from the top while sliding on channel as shown in illustration B. The idea is to flatten the rails together to prevent the channels from binding.



**42. Shrink wraparound sleeve**

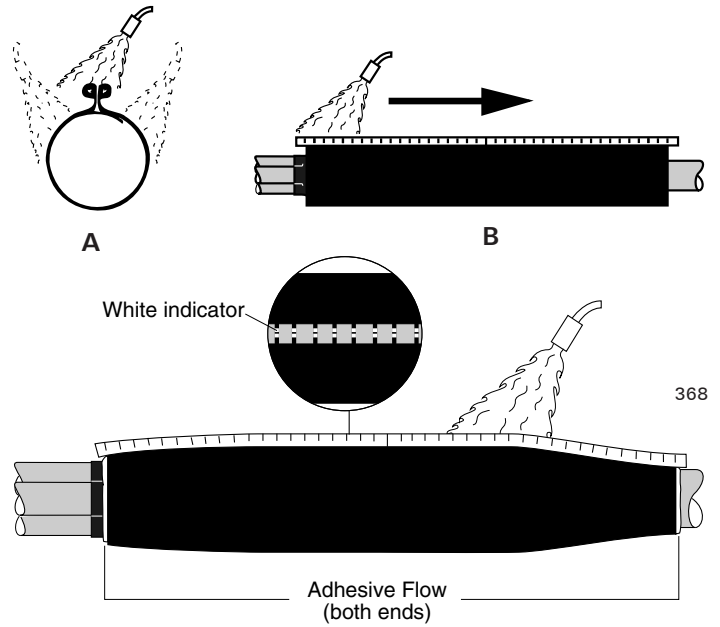
Preheat evenly along both sides of the rail/channel area until this area begins to shrink. To achieve uniform heating, move the flame back and forth from one side of the channel to the other as shown in illustration "A" while moving flame along the entire length of the channel as shown in illustration "B" until the sleeve starts to shrink. This technique will assure a properly preheated rail and channel area.

Begin shrinking at the center of the sleeve and work toward each end. Apply heat until the sleeve is fully shrunk and the heat-sensitive green paint is completely converted to black. Continue heating the rail/channel area for another 5 seconds per foot. A white line should be visible in the channel gaps indicating sufficient heating.

**Note:** Green heat-sensitive paint will turn black as sleeve shrinks in place.

**This completes the splice.**

**Note:** Allow to cool before moving or placing in service.

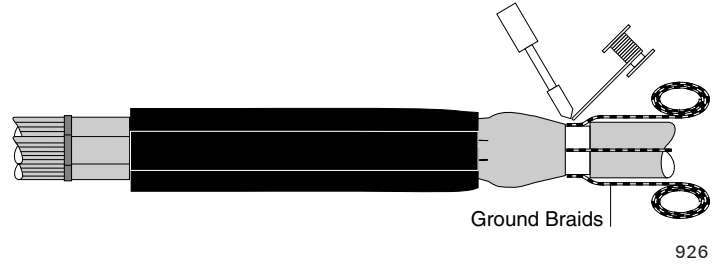


**Choice 5**

**If Unjacketed Concentric Neutral cable**

**43. Install ground braids**

Space the braids evenly around the PILC cable and solder to the lead sheath.



**44. Solder block ground braids**

To prevent the ingress of moisture, solder-block the ground braids for 2 inches (50mm) from the PILC jacket cut measurement (or equivalent measurement if unjacketed).



**45. Clean PILC cable jacket**

Solvent clean and abrade the cable jacket as shown.



**46. Apply red sealant**

Apply one layer of red sealant onto the cable jacket as shown.



**47. Apply red sealant**

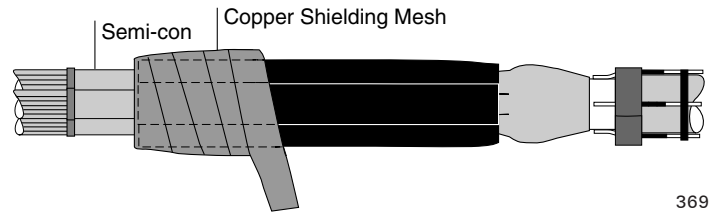
Bring the braids forward and temporarily tape them to the PILC cable to hold them in position.

Press the braids onto the sealant. Apply one layer of sealant directly over the braids and the first layer of sealant.



#### 48. Apply shield mesh

Starting at the poly cable semi-con, wrap one half-lapped layer of 2-inch (50mm) wide shielding mesh across the splice and solder to the PILC cable lead sheath.

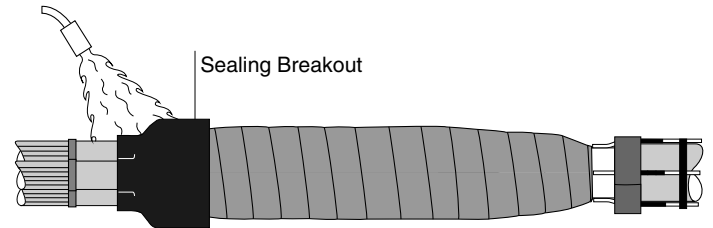


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#### 49. Position non-conductive sealing breakout; shrink in place

Position the breakout on the poly cable semi-con, with the fingers clear of the neutral wires and the body over the three splices.

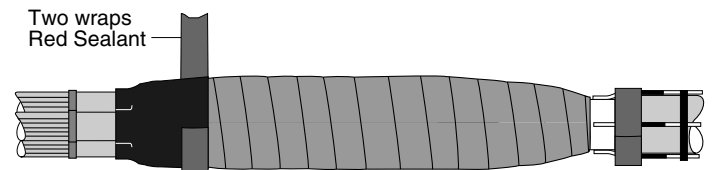
Shrink in place starting with the fingers and working toward the splice center.



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#### 50. Apply red sealant

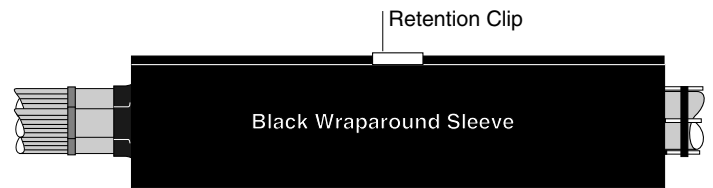
When the breakout has cooled sufficiently to touch, apply two wraps of red sealant to the body of the breakout.



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#### 51. Position wraparound sleeve

Remove or tape over all sharp points to prevent puncture of wraparound sleeve. Remove backing from wraparound sealing sleeve and center sleeve over splice. Slide metal channel onto the butted rails.



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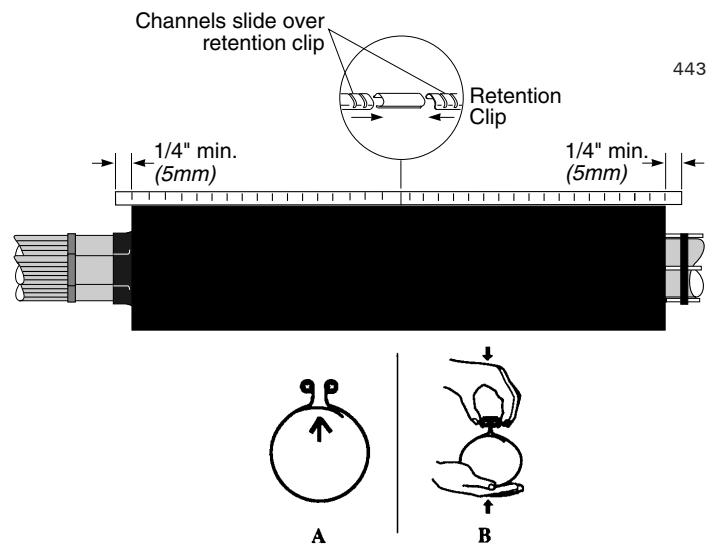
#### 52. Install channels

Slide channels onto the rail. Connect the channels by having them overlap the retention clip as shown at right.

**Note:** Channels must overlap sleeve edge by 1/4 inch minimum.

**If channels slide on easily go to step 53. If channel fit seems tight, continue with next paragraph.**

As shown in illustration A, make sure flap is not pinched between the rails. Push the sleeve up from the bottom and down from the top while sliding on channel as shown in illustration B. The idea is to flatten the rails together to prevent the channels from binding.



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### 53. Shrink wraparound sleeve

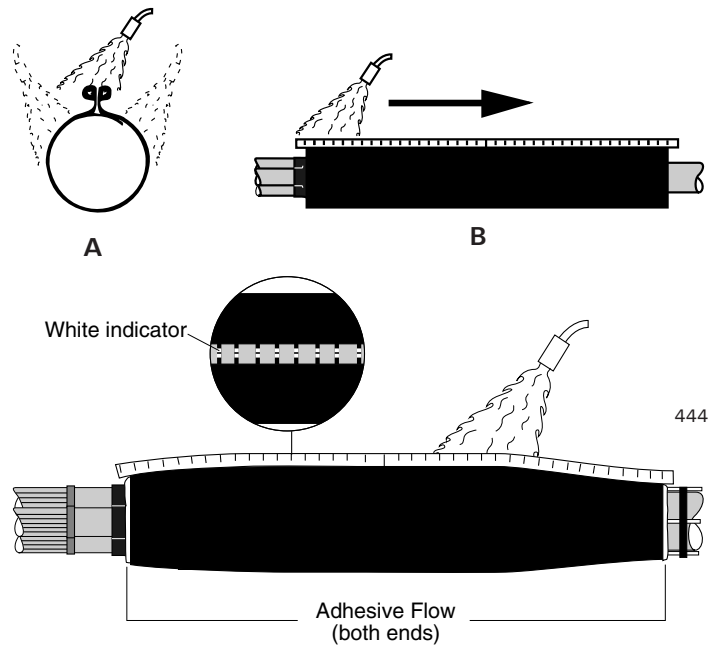
Preheat evenly along both sides of the rail/channel area until this area begins to shrink. To achieve uniform heating, move the flame back and forth from one side of the channel to the other as shown in illustration "A" while moving flame along the entire length of the channel as shown in illustration "B" until the sleeve starts to shrink. This technique will assure a properly preheated rail and channel area.

Begin shrinking at the center of the sleeve and work toward each end.

Apply heat until the sleeve is fully shrunk and the heat-sensitive green paint is completely converted to black. Continue heating the rail/channel area for another 5 seconds per foot. A white line should be visible in the channel gaps indicating sufficient heating.

**Note:** Green heat-sensitive paint will turn black as sleeve shrinks in place.

**Note:** Allow to cool before moving or placing in service.

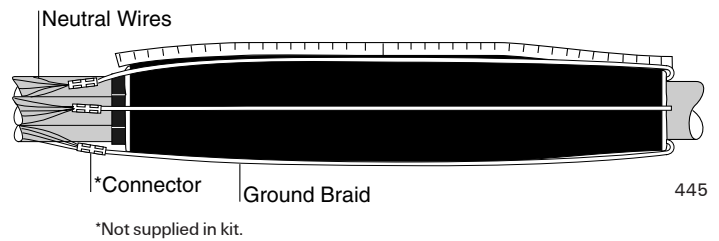


### 54. Connect ground braids

Fold braids back over the splice and crimp or solder to the concentric neutral wires.

**This completes the splice.**

**Note:** Allow to cool before moving or placing in service.



The Information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product. However, Tyco Electronics Corporation has no control over the field conditions which influence product installation. It is the user's responsibility to determine the suitability of the installation method in the user's field conditions. Tyco Electronics' only obligations are those in Tyco Electronics' standard Conditions of Sale for this product and in no case will Tyco Electronics be liable for any other incidental, indirect or consequential damages arising from the use or misuse of the products.

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