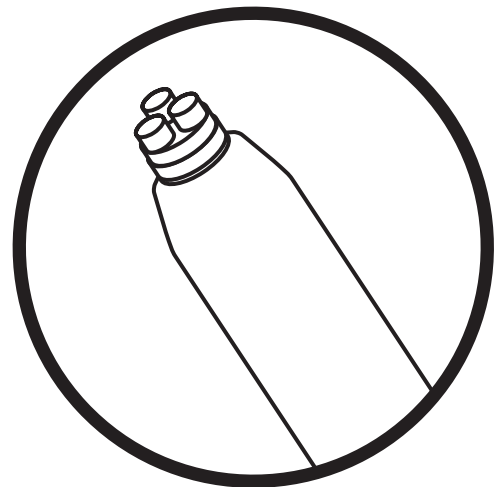


HVS-3-1590S
15kV Class

Splice for 3/C PILC to 3/C
PILC Power Cable



Note: This kit does not
allow cross-phasing

Energy Division

General Instructions

As a minimum, the following items should be included in this kit.

- | | |
|--|---|
| <ul style="list-style-type: none"> 3 Black/red dual wall tube 3 Long Oil barrier tubes 3 Short oil barrier tubes 3 Short conductive tubes 3 Long conductive tubes 1 Wraparound re-jacketing tube 3 Copper braids 2 Roll springs 1 Installation instruction 2 Conductive breakouts 2 Stress Relief Material inserts 3 Phials silicon grease | <ul style="list-style-type: none"> 1 Roll adhesive tape 3 Wraparound re-jacketing channels and clip 6 Angle cut strips stress relief material 2 1.0" rolls copper mesh 8 Thick red sealant strips 6 Thin red sealant strips Long strips Stress relief material 2.0" rolls copper mesh |
|--|---|

General Instructions

Suggested Installation Equipment (not supplied with kit)

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> • Cable preparation tools • Tyco Electronics P63 cable preparation kit or cable manufacturer approved solvent | <ul style="list-style-type: none"> • Clean, lint-free cloths • Non-conducting abrasive cloth, 120 grit or finer • Electrician's tape | <ul style="list-style-type: none"> • Connector(s) and installation tools • Tyco Electronics recommended torch |
|--|---|---|

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 (uses refillable propane cylinders) and FH-2616A1 (uses disposable cylinder).

Safety Instructions

Warning: 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.

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-2616A1	Full pressure
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.

2. Check ground braid.

Verify that ground braid(s) or bond wire have equivalent cross-section to cable metallic shield.

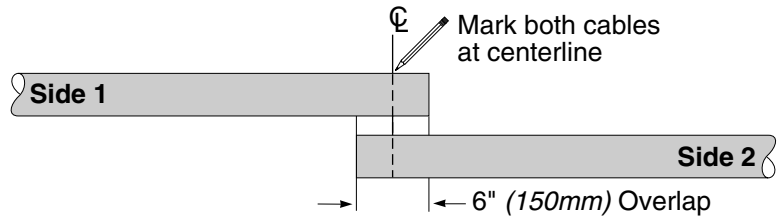
Raychem HVS-EG supplies ground braid, spring clamp and suggested modifications to make an external ground or shield interrupt.

Table 1

Kit	Nominal Cable Range	Insulation Diameter Range	Maximum Connector Dimensions	
			Length	Diameter
HVS-3-1591S	#2-350	0.65-1.00" (17-25mm)	3.0" (76mm)	0.90" (23mm)
HVS-3-1592S	4/0-600	0.85-1.25" (22-32mm)	4.0" (102mm)	1.20" (30mm)
HVS-3-1593S	500-1000	1.00-1.50" (25-38mm)	5.0" (127mm)	1.60" (41mm)

3. Overlap cables; mark centerline.

Train cables into place and overlap by approximately 6" (150mm). Mark the center line of the overlap.



4. Prepare cables

Find the cable type (Choice 1 or 2) and follow the directions given.

Table 2

Kit	Jacket Cutback A*	Jacket Cutback B*
HVS-3-1591S	19" (483mm)	30-1/2" (775mm)
HVS-3-1592S	20" (508mm)	33-1/2" (851mm)
HVS-3-1593S	20" (508mm)	33-1/2" (851mm)

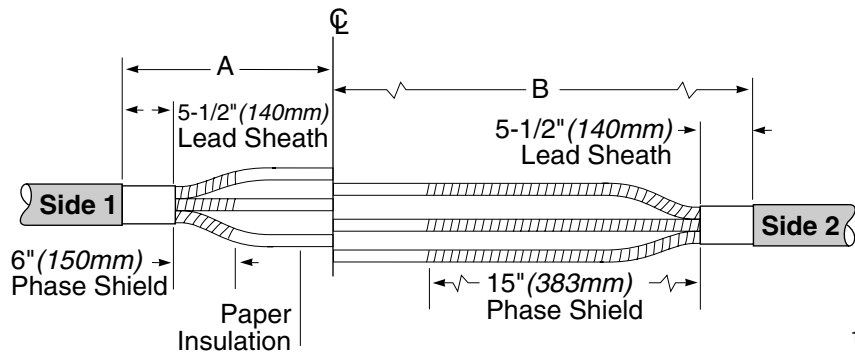
*Mark PILC cable, if unjacketed.

CHOICE 1

3/C Shielded PILC Cable

Cut the Side 1 cable at the mark made in Step 3. *Do not prepare side 2 at this time.* Refer to Table 2 and prepare the Side 1 cable as shown. Secure and cover sharp edge of shield with adhesive PVC tape.

Go to Step 5, Page 4.

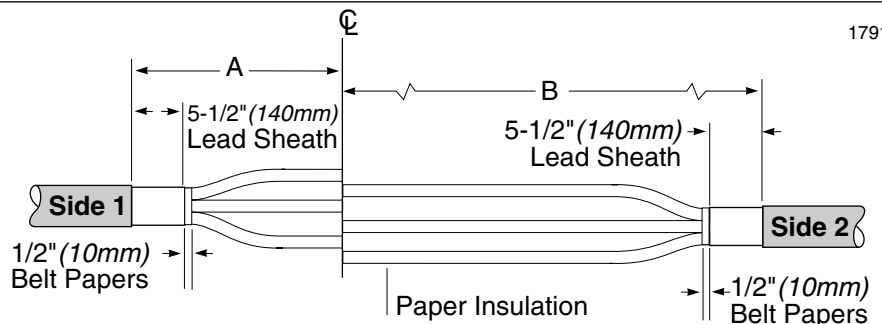


CHOICE 2

3/C Belted PILC Cable

Cut the Side 1 cable at the mark made in Step 3. *Do not prepare side 2 at this time.* Refer to Table 2 and prepare the Side 1 cable as shown.

Go to Step 5, Page 4.



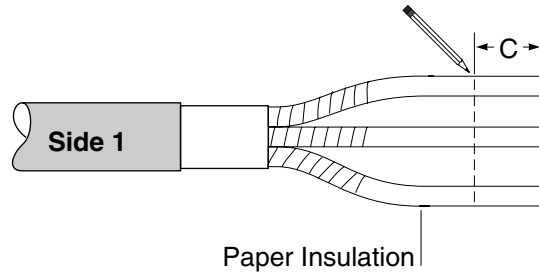
Installation Instructions

5. Mark insulation.

Calculate Dimension C (shown below) and mark the cable as shown.

$$C = 1/2 \text{ length of connector} + 1-1/2''$$

$$C = 1/2 \text{ length of connector} + 40\text{mm}$$

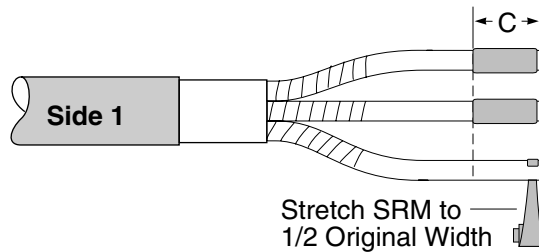


1792

6. 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.

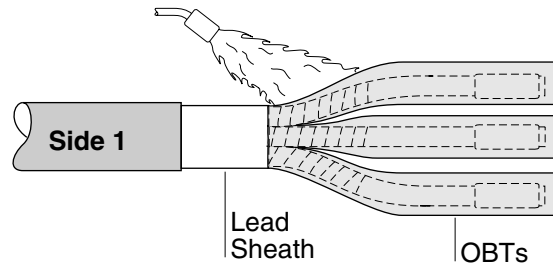


1793

7. 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.

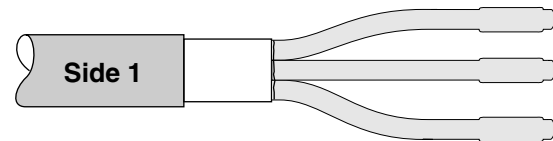
Note: To achieve a smooth, wrinkle-free installation, use a reduced flame to install the thin-walled OBT.



1794

8. Inspect OBTs.

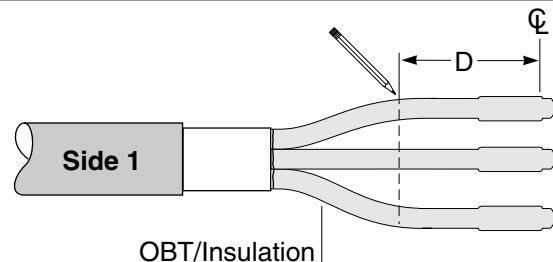
The installed OBTs should have a smooth, wrinkle-free surface after shrinking. Reheat to smooth any wrinkled areas.



1795

9. Mark OBT/ Insulation at D.

Kit	D
HVS-3-1591S	5.5" (140mm)
HVS-3-1592S	6.50" (165mm)
HVS-3-1593S	7" (180mm)

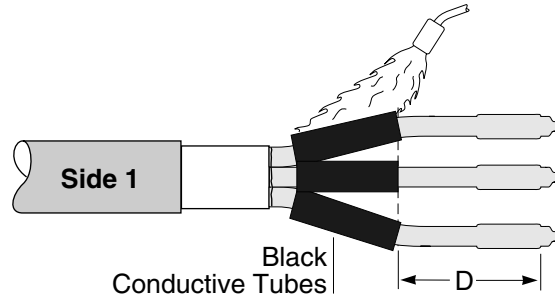


1798

10. Position black conductive tubes; shrink in place.

Place black conductive tube over each phase and position at Dimension D.

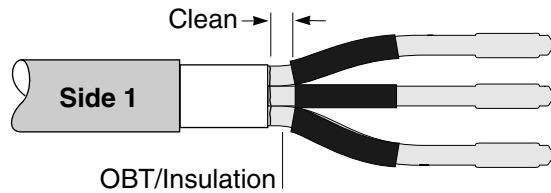
Shrink in place starting at the end nearest to the center of the splice.



1799

11. Clean OBTs.

Using an oil-free solvent, clean the OBT/Insulation, as shown.

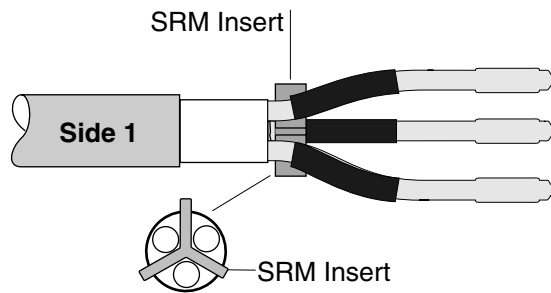


1800

12. Install SRM insert.

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

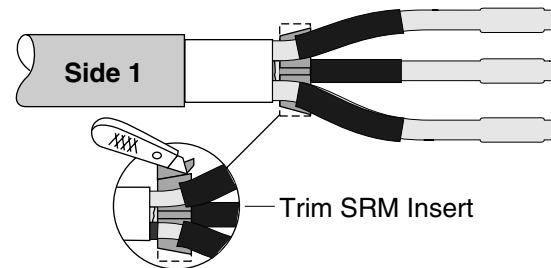
Note: The SRM insert is packaged inside the conductive breakout.



1801

13. Trim excess SRM insert.

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

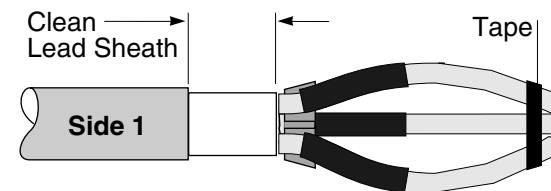


1802

14. Clean lead sheath.

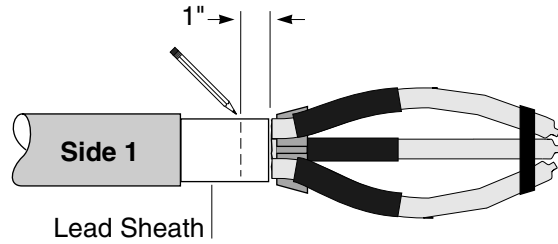
Reclean lead sheath as shown using an approved solvent.

Note: To ensure adhesion of the OBT to the SRM insert, temporarily tape the ends of the three cores together.



1803

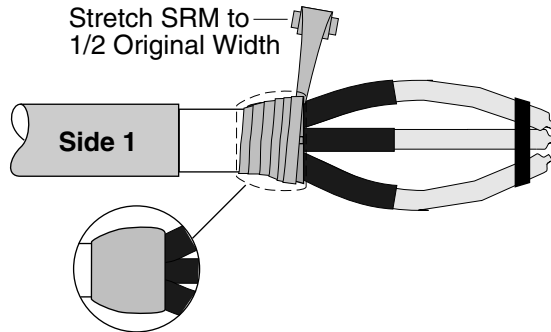
15. Mark lead sheath as shown.



1804

16. 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 strips of SRM should be used to build the SRM to the shape shown.

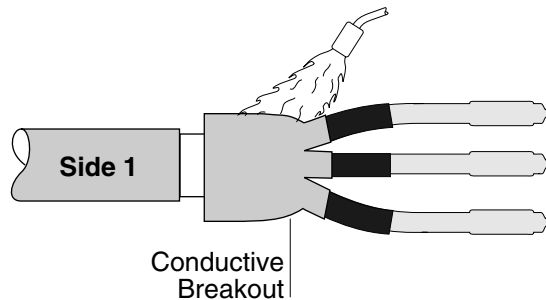


1805

17. Position conductive breakout; shrink in place.

Remove temporary tape from core ends.

Position the conductive breakout over the SRM so that the inside **BUTTS UP HARD AGAINST THE SRM.**

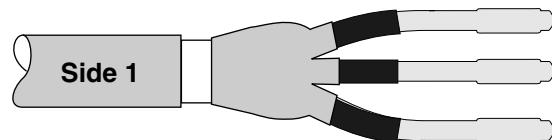


1806

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

18. Inspect breakout.

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

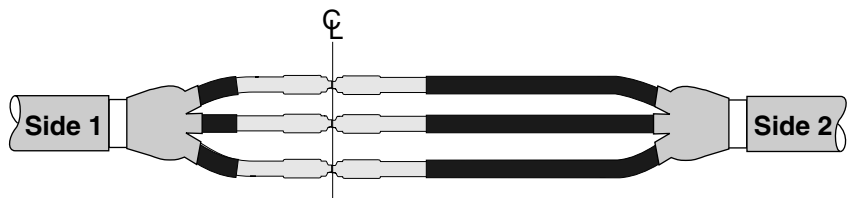


1807

19. Prepare Side 2 cable.

Return to Page 3 and repeat Steps 4-18 to prepare the Side 2 cable.

When Side 2 cable is prepared, continue on to Step 20.

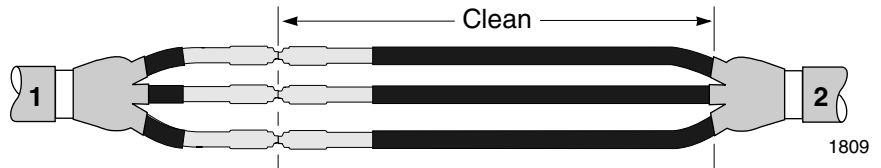


1808

Installation Instructions

20. Clean cables.

Clean Side 2 conductors as shown.



1809

Table 3

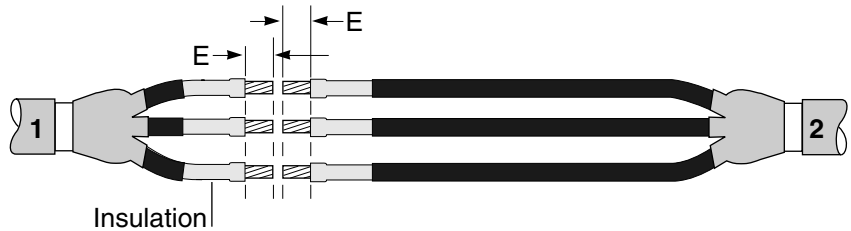
Kit	Maximum Connector Dimensions	
	Length	Diameter
HVS-3-1591S	3.0" (76mm)	0.85" (22mm)
HVS-3-1592S	4.0" (102mm)	1.20" (30mm)
HVS-3-1593S	5.0" (125mm)	1.50" (38mm)

21. Remove insulation.

Refer to Table 3 and calculate Dimension E (shown below) and cut back insulation.

$$E = 1/2 \text{ length of connector} + 1/4"$$

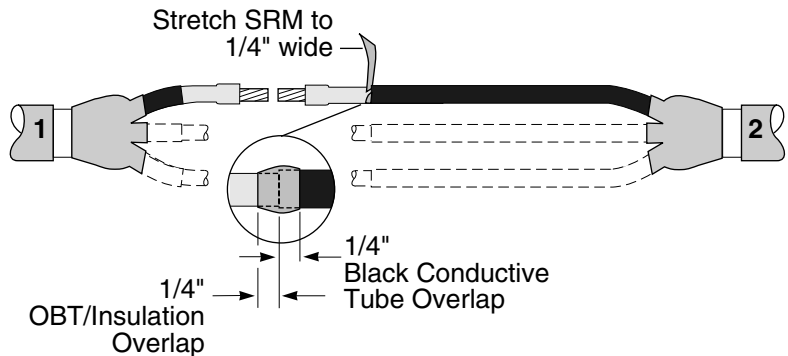
$$E = 1/2 \text{ length of connector} + 5\text{mm}$$



1810

22. Apply SRM at black conductive tube steps on side 2.

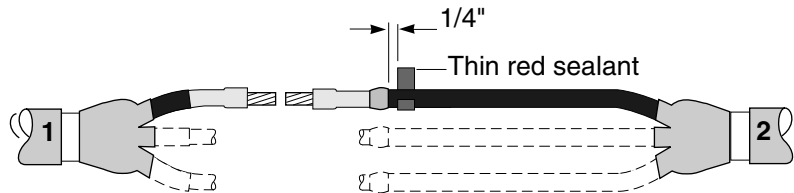
Remove backings from the *short angle-cut piece* of SRM. Place tip of SRM at black conductive tube step and tightly wrap to fill the step. Overlap black conductive tube and OBT/Insulation and taper down to meet OBT insulation as shown.



1815

23. Apply red sealant strip on side 2.

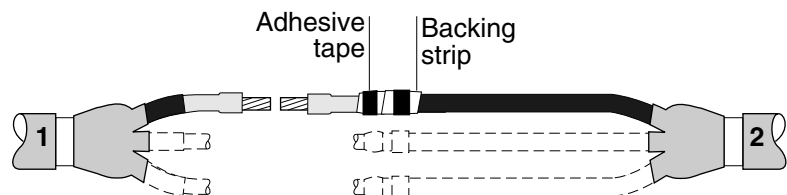
Apply one full wrap of **thin** red sealant onto the black conductive tube 1/4" from the previously applied SRM.



1815A

24. Protect SRM and red sealant on side 2.

Using the **UNPRINTED** backing strips from step 16, wrap one layer around the SRM and red sealant and fix with electrician's adhesive tape.



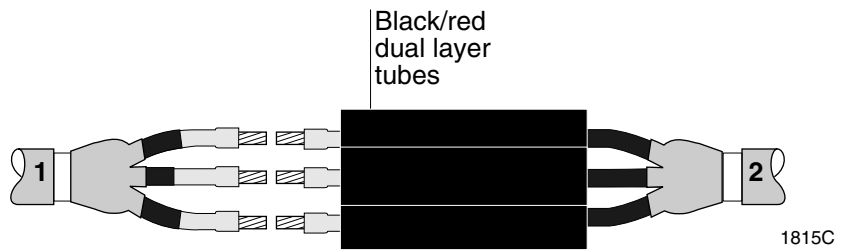
1815B

Repeat on other 2 phases on side 2.

Installation Instructions

25. Position tubes.

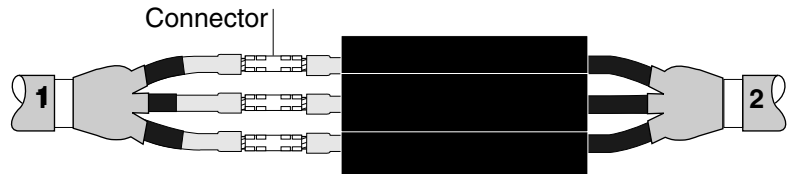
Taking care not to disturb the SRM and sealant, place one dual layer tube over each core.



1815C

26. Install connectors.

If using solder connectors, tightly bind the exposed OBT with protective cotton tape. Cover exposed tubes to protect against solder splash.



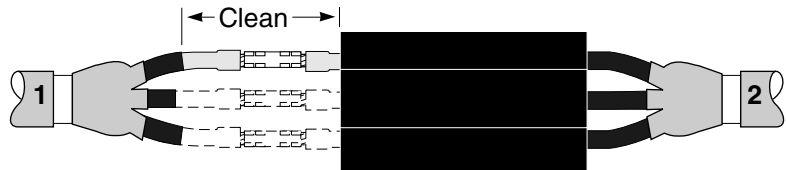
1811

After installation, deburr connections.

27. Clean connector area.

Complete Steps 27-28 working on one phase at a time.

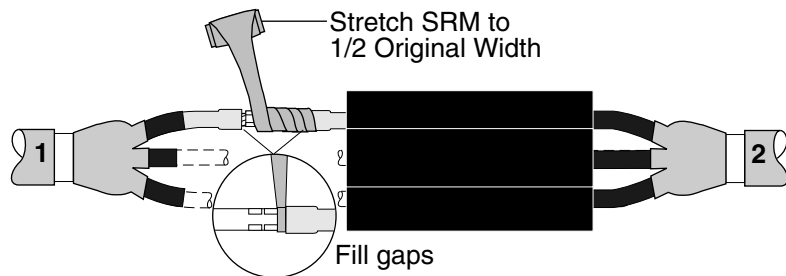
Using an approved solvent, clean the insulation as shown, paying particular attention to the OBT/insulation surface.



1812

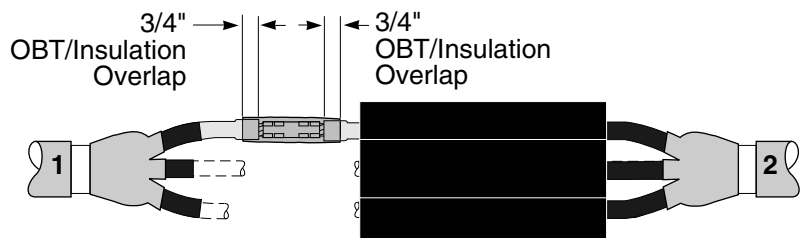
28. Apply SRM over connector, apply Discharge Control Compound (DCC).

28a. 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.



1813

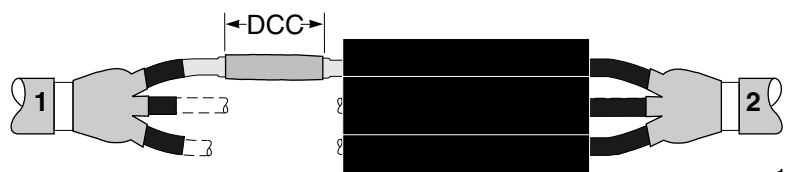
28b. Continue to wrap the SRM onto the insulation/OBT as shown. Form a smooth profile over the connector. The finished SRM diameter should be slightly larger than the core insulation.



1814

28c. Snip open the end of the DCC ampule and apply a thin film of compound on the SRM over the connector.

Apply thin film of DCC over surface of installed SRM



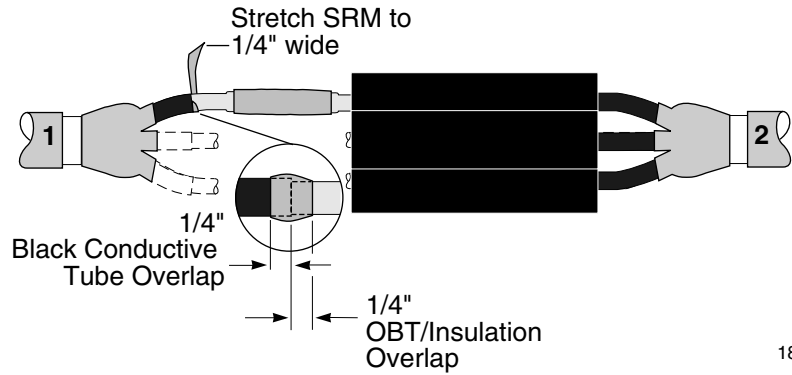
1814s

Repeat Steps 27-28 for the remaining phases.

Installation Instructions

29. Install SRM at black conductive tube steps on side 1.

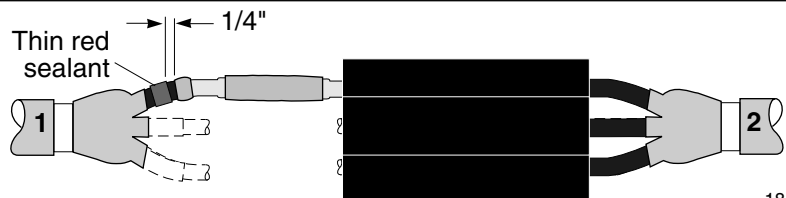
Remove backings from the *short angle-cut piece* of SRM. Place tip of SRM at black conductive tube step and tightly wrap to fill the step. Overlap black conductive tube and OBT/Insulation and taper down to meet OBT insulation as shown.



1814a

30. Install red sealant strip on side 1.

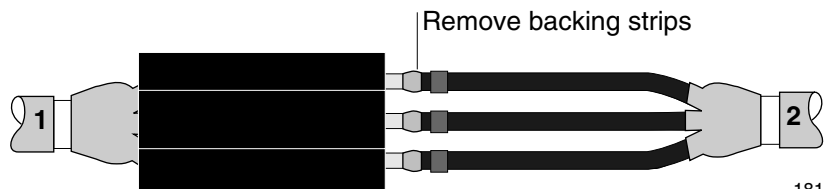
Apply one full wrap of **thin** red sealant onto the black conductive tube 1/4" from the previously applied SRM.



1814b

31. Remove backing strips from side 2.

Position dual layer tubes as shown and remove backing strips from side 2.



1814c

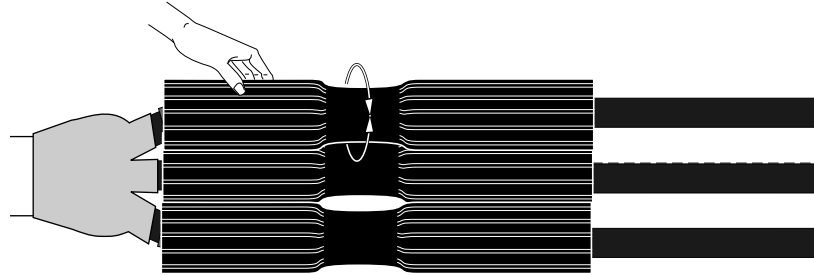
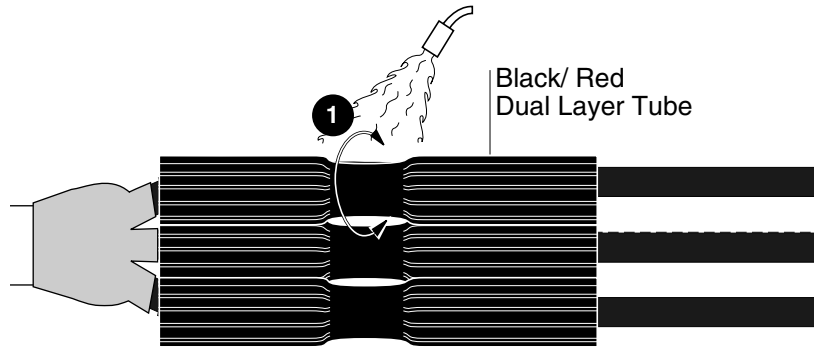
32. Position black/red dual layer tubes; shrink in place.

Center tubes over joint.

(1) Begin shrinking in center of tubes, working torch around all sides of the tubes. *Pay particular attention to the back and underside of the tubes.*

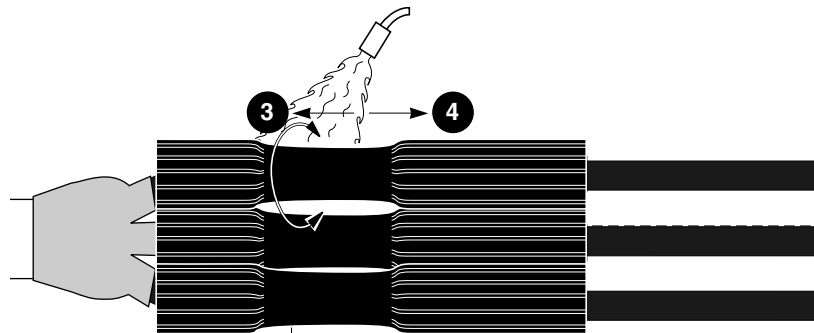
Note: Shrink all three tubes at the same time.

(2) Before continuing, gently twist the unshrunk end of the tubes to feel for resistance to movement in center indicating the center is shrunk.



2 Twist gently to check for resistance to movement in center.

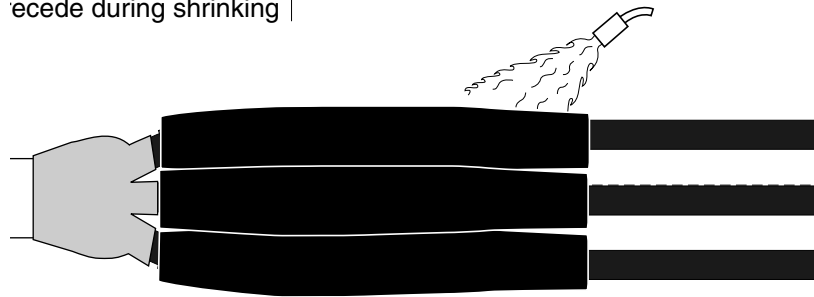
Shrink from the center toward one end (3) and then towards the other end (4).



Raised ridges will recede during shrinking

(5) After all tubes have completely shrunk, heat the entire tubes for approximately 1 minute.

Note: (6) The raised ridges should disappear. Absence of ridges can be observed by visual inspection and by feeling surface with a gloved hand.



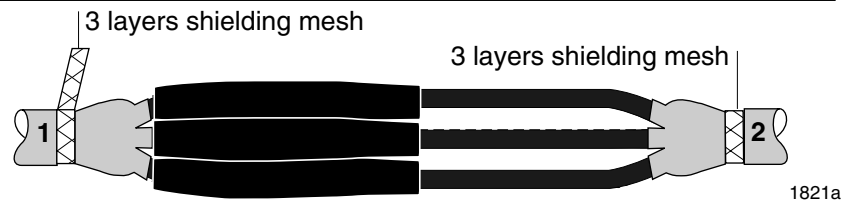
5 Post heat 1 minute

6 Inspect tube. Absence of raised ridges can be observed by visual inspection and by feeling the surface with a gloved hand.

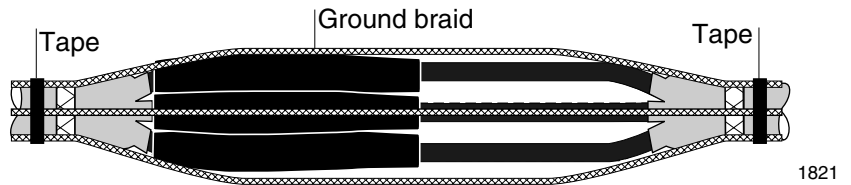
Installation Instructions

33. Install ground braids.

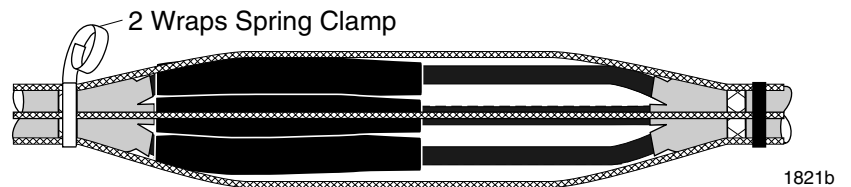
Wrap three layers of 1" wide copper mesh around the lead sheath on both sides of the joint adjacent to the end of the breakout. Tie off with a half-hitch.



Lay the three braids across the joint evenly spaced around the joint circumference so that the braids overlap the mesh by about three inches. Temporarily tape the braids in position.

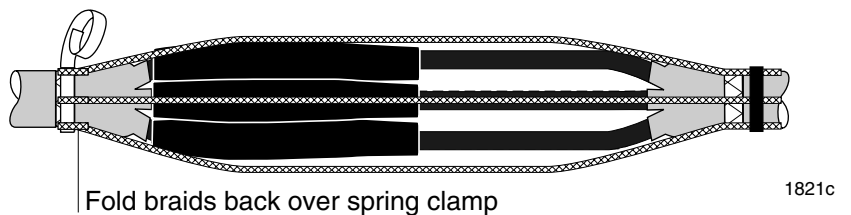


Make two wraps of spring clamp over the braids and mesh.

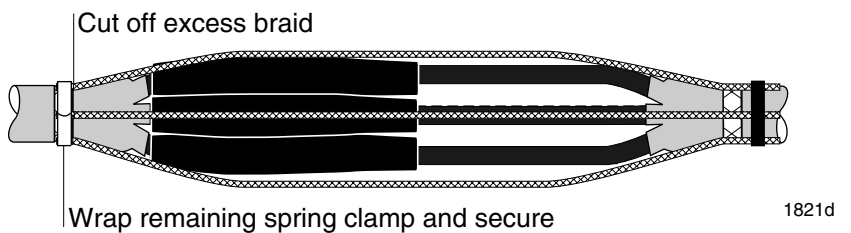


Remove the temporary tape.

Fold back the overlapping braids over the spring clamp and wrap the remaining spring clamp. Tighten and secure the spring clamp. Cut off excess braids.

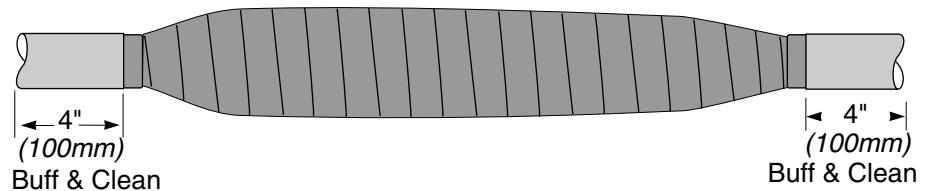


Repeat on other side of the joint.



34. Apply shielding mesh.

Starting at the lead sheath on one side of the splice, wrap one half-lapped layer of 2 inch wide shielding mesh across the splice. Tie off with a half hitch.



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

Installation Instructions

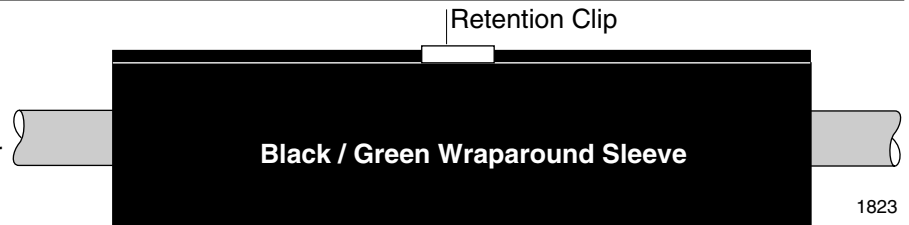
35. Apply red sealant.

Apply one wrap of **thick** red sealant onto the lead sheath on each side of the splice as shown.



36. 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 retention clip onto the butted rails.



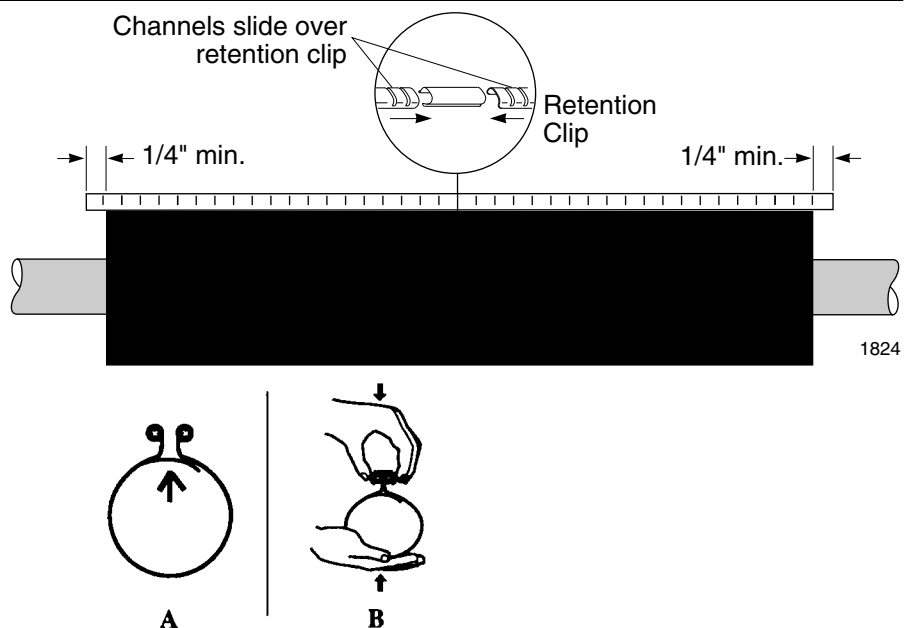
37. Install channels.

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 38, page 13. 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.



38. Shrink wraparound sleeve.

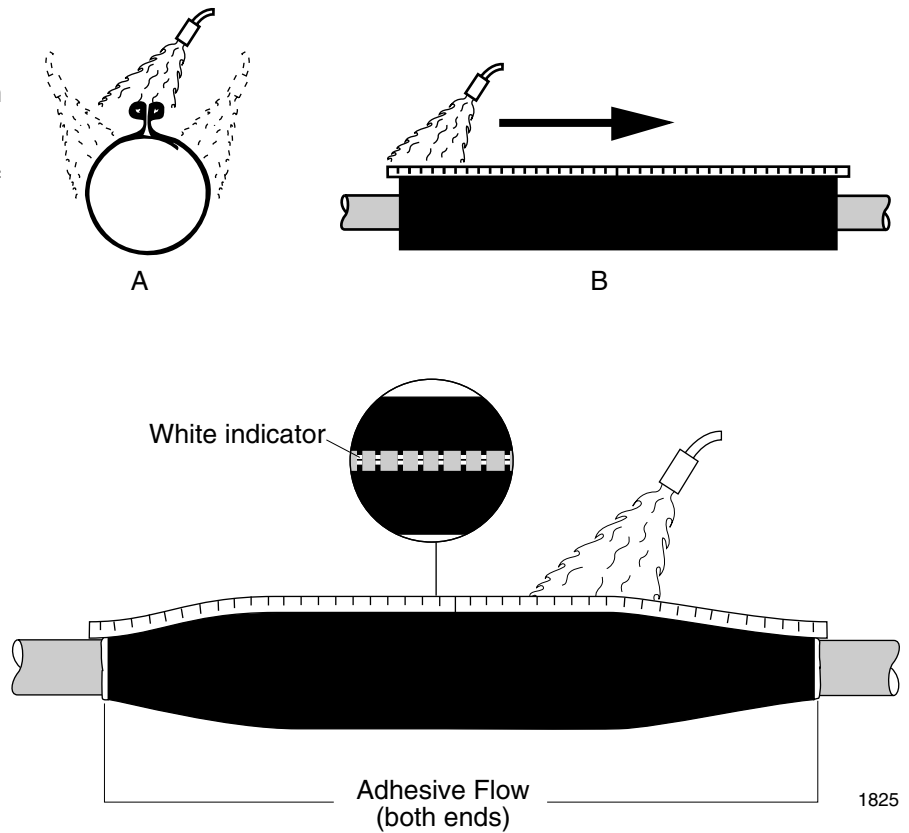
Preheat evenly along both sides of the rail/channel area until this area begins to shrink. To achieve uniform heating, move the flame back and forth from one side of the channel to the other as shown in illustration "A" while moving flame along the entire length of the channel as shown in illustration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



1825

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