

Example Installation Instructions

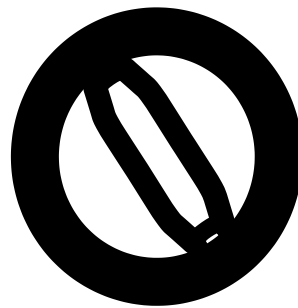
EHVS-69...-W Series

69 kV Class

Splice for Extruded Dielectric
(Poly/EPR) Power Cables:

Wire Shield or Lead Sheath
Power Cables

External Grounding and Shield
Break not addressed



General Instructions

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

- | | |
|---|--|
| <ul style="list-style-type: none"> 1 Black stress control tube 1 Red/red dual layer insulating tube 1 Black/red dual layer tube 1 CRSM wraparound sleeve 1 Conductive paint 4 Roll springs 6 Foil tape 2 Copper braids 1 Roll friction tape 1 Connector | <ul style="list-style-type: none"> Wraparound channels Wraparound clips Silicone grease Copper shielding mesh Black sealant Aluminum heat deflectors |
|---|--|

General Instructions

Suggested Installation Equipment (not supplied with kit)

- | | | |
|---|---|--|
| <ul style="list-style-type: none"> • Cable preparation tools • Raychem 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 • Raychem recommended torch |
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Recommended Raychem 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 Raychem 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 Raychem 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.

1. Product selection.

Check kit selection with cable diameter dimensions in Table 1.

Table 1	69 kV Nominal Cable Range	46 kV Nominal Cable Range	Maximum Jacket Diameter	Insulation Diameter Range
Kit				
EHVS-6920-W			2.00" (51mm)	1.35-1.75" (34-44mm)
EHVS-6921-W			2.85" (72mm)	1.70-2.35" (43-60mm)
EHVS-6922-W			3.00" (76mm)	2.05-2.55" (52-65mm)
EHVS-6923-W			3.85" (98mm)	2.50-3.05" (63-77mm)

2. Prepare cables.

Choose the cable type (Choice 1 or 2) and use the dimensions shown in Table 2 to prepare the cables.

Table 2	Jacket Cutback A	Wire & Concentric Neutral Cutback B	Metallic Shield Cutback C	Semi-con Cutback D
Kit				
EHVS-6920-W	20-1/2" (520mm)	15-1/2" (400mm)	16-1/2" (420mm)	12" (305mm)
EHVS-6921-W	20-1/2" (520mm)	15-1/2" (400mm)	16-1/2" (420mm)	12" (305mm)
EHVS-6922-W	20-1/2" (520mm)	15-1/2" (400mm)	16-1/2" (420mm)	12" (305mm)
EHVS-6923-W	22" (560mm)	17" (430mm)	18" (455mm)	13-1/2" (340mm)

CHOICE 1

Wire Shield and Jacketed Concentric Neutral cable

go to Choice 1 below.

CHOICE 2

Lead Sheath cable

go to Choice 2 on Page 4.

CHOICE 1

Wire Shield and Jacketed Concentric Neutral cable

Make sure that the cables to be joined are straight and level.

Overlap the two cables 34" (860mm). Mark a reference line at 4" (100mm) from one end and 30" (760mm) from the end of the other cable, as shown.

Remove the cable jacket on both cables to Dimension "A" from the reference line.

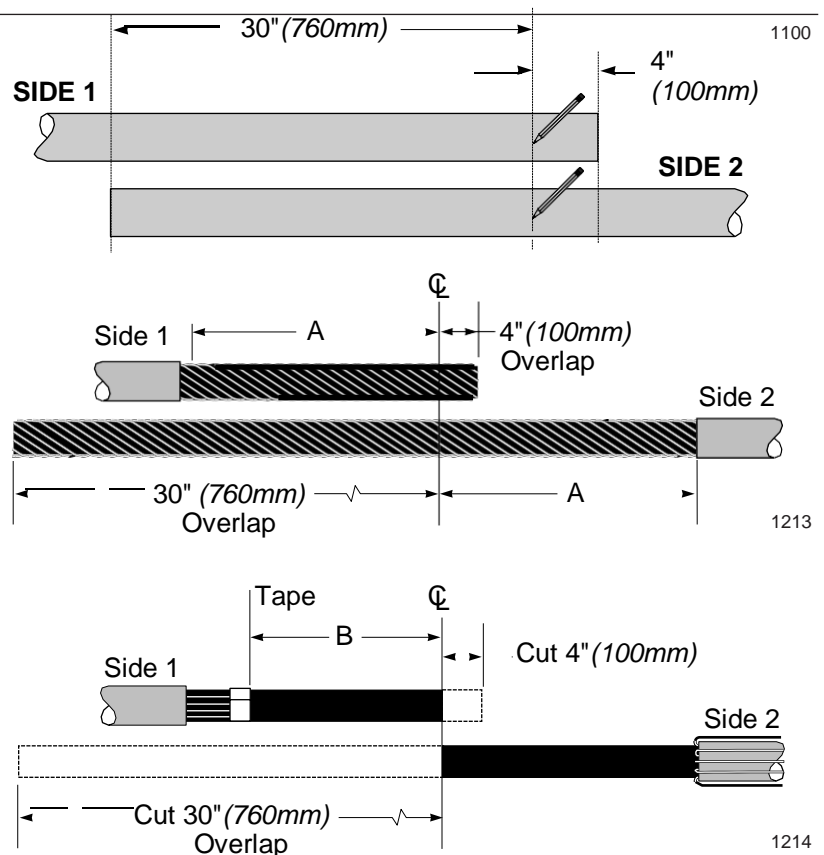
Note: For cables with a graphite coated jacket, apply protection tape for a length of about 40" (1 m) on side 1.

Fold back the neutral wires on side 1 and 2 and tape them to the cable jacket.

Note: For cable with copper tape under the wire shield, cut back the copper tape to dimension "B" and fasten in place with the copper tape strips supplied.

Cut both sides at the center line. Fold back and trim the neutral wires on side 1 to dimension "B" and tape as shown.

Go to Step 3, Page 4.



CHOICE 2

Metallic Tape, Longitudinally Corrugated (LC) Shield, or Lead Sheath cable

Make sure that the cables to be joined are straight and level.

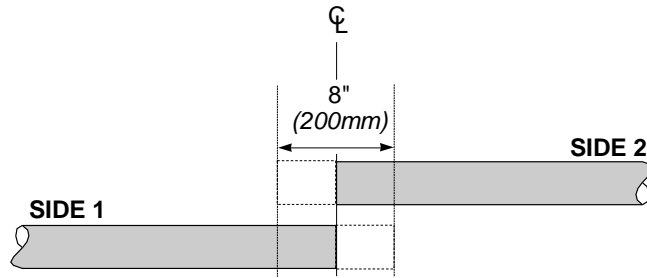
Overlap the two cables 8" (200mm) and cut at the centerline, as shown.

Refer to Table 2 on Page 3. Remove the cable jacket and metallic shield as shown.

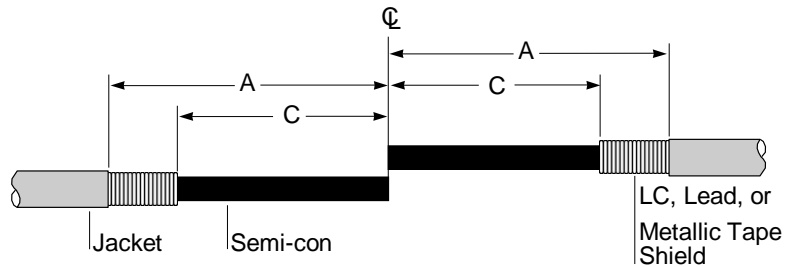
Note 1: Tape ends of metallic shield with copper foil tape provided.

Note 2: For cables with a graphite coated jacket, apply protection tape for a length of about 40" (1 m) on side 1.

Note 3: Dimension "C" allows the use of power semi-con removal tools with a 4.0" maximum clearance. For tools with a greater clearance, please contact Raychem for assistance.



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1329

Go to Step 3.

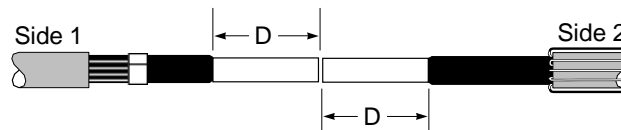
3. Remove semi-con.

Refer to Table 2 on Page 3 and cut back the semi-con as shown.

Use a round file at termination of semi-conductive layer.

Do not nick the insulation.

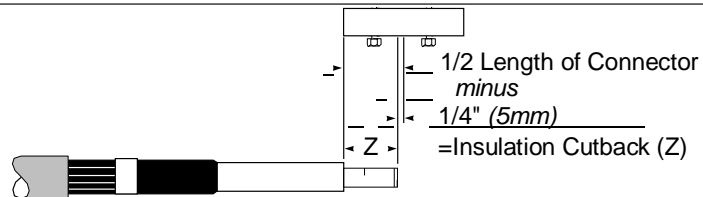
Note: If using Kerite cable with a Permashield layer, the Permashield should be regarded as insulation semi-con and MUST be removed.



1214a

4. Remove insulation.

Cut back the insulation to 1/2 the connector length minus 1/4" (5mm).

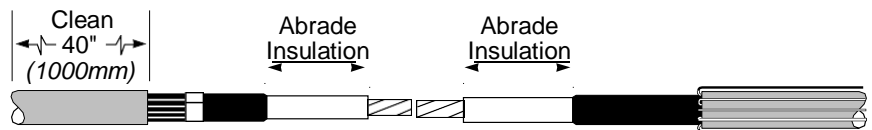


400a

5. Abrade insulation; clean cable jackets.

Abrade and clean insulation, as necessary, to remove imbedded semi-con.

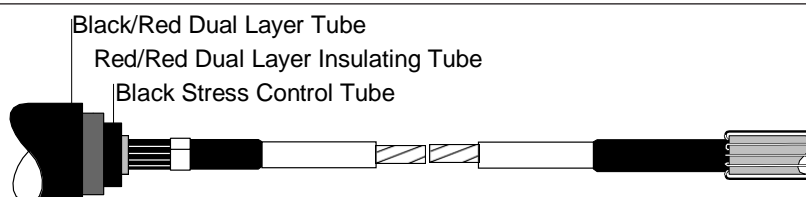
Clean cable jacket as shown.



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6. Place nested tubes over cable.

Protect tubes from end of conductor as they are placed over side 1 cable end.



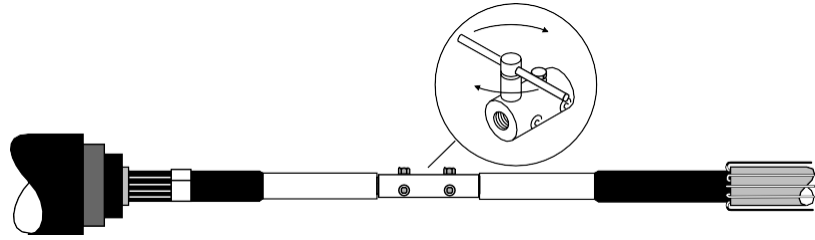
1374

7. Install connector.

Fit conductors into connector so that connector end lines up with insulation. **No gaps should be left between connector and insulation.**

"Hand tighten" each bolt. Then, using a socket or box wrench, tighten each bolt an additional 1/2 turn.

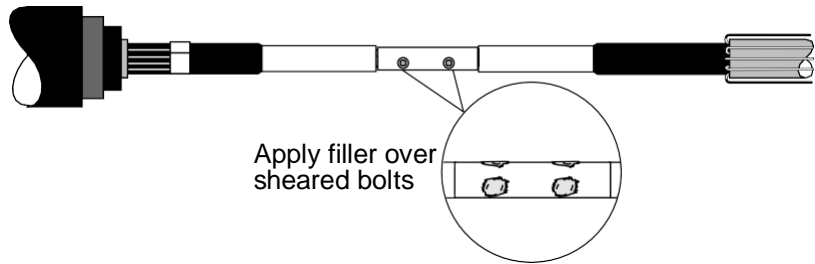
Continue to tighten each bolt until the head shears off.



1375

8. Apply filler.

Apply filler over the sheared bolts to obtain a smooth finish.



1376

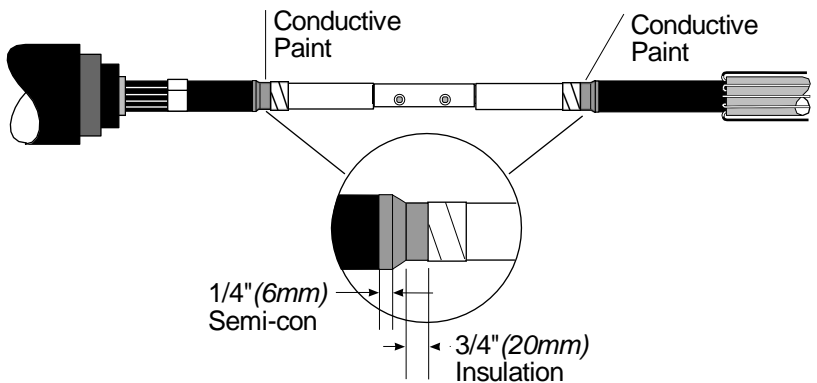
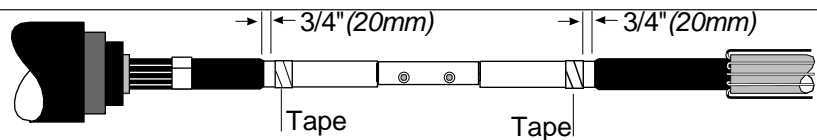
9. Apply tape; apply conductive paint.

Apply tape (adhesive side up) on the insulation 3/4" (20mm) from semi-con cutback. Repeat on other side of joint

Shake bottle of conductive paint for 30 seconds. Apply conductive paint onto the 3/4" (20mm) of insulation and overlap semi-con (beyond chamfer) shield by 1/4" (6mm). Repeat on other side.

Note: Do not splash paint on insulation between masking tape and connector.

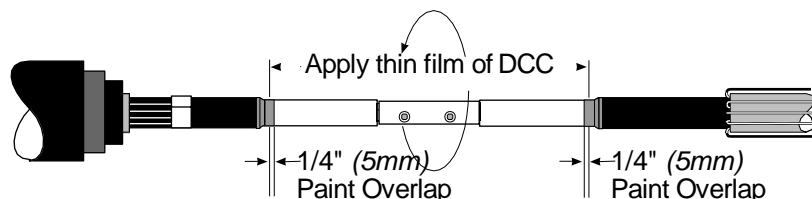
Allow paint to dry about 5 minutes, then remove tape on both sides.



1377

10. Apply Discharge Control Compound (DCC).

Apply a thin layer of DCC to the surface of the insulation and connector. Overlap the conductive paint by 1/4" (6mm).



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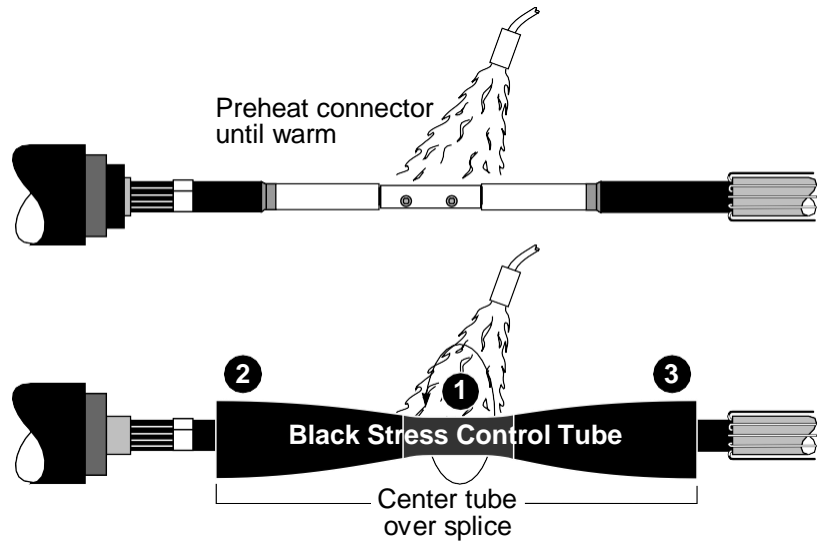
Installation Instructions

11. Pre-heat connector; position Black Stress Control tube and shrink in place.

Preheat connector for approximately 1 minute or until warm.

Center black stress control tube over splice as shown. Begin shrinking at center of tube (1), working torch with a smooth, brushing motion around the tube. After center portion shrinks, work torch as before toward one end (2), then to the opposite end (3). Apply sufficient heat to ensure complete shrinkage indicated by a smooth surface profile.

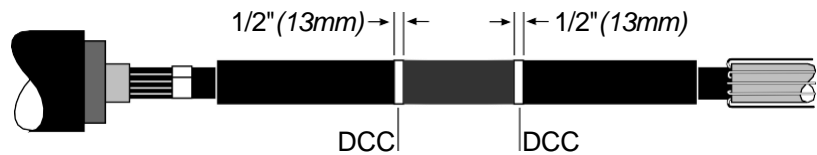
Note: Do not point the flame directly at the cable semi-con layer.



1378

12. Apply DCC to matte surface.

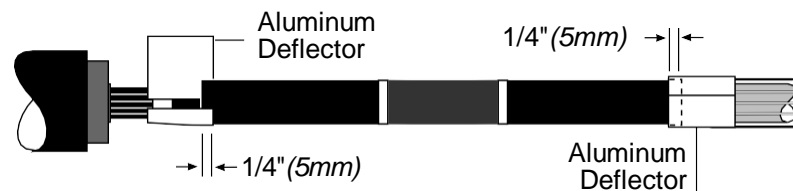
Apply a thin film of DCC approx. 1/2" (13mm) width around the edges of the matte surface in the center of the stress control tube.



1441

13. Install aluminum deflectors.

Remove backing and wrap the aluminum deflector 1/4" (5mm) on the black stress control tube and onto the shielding as shown.



1441a

14. Position Red/Red Dual Layer Insulating Tube; shrink in place.

Note: The red/red dual layer/insulating tube takes longer to shrink than previous tube.

Center tube over joint.

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

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

(3) Shrink from the center toward one end and stop about 4" (100mm) from the end of the tube.

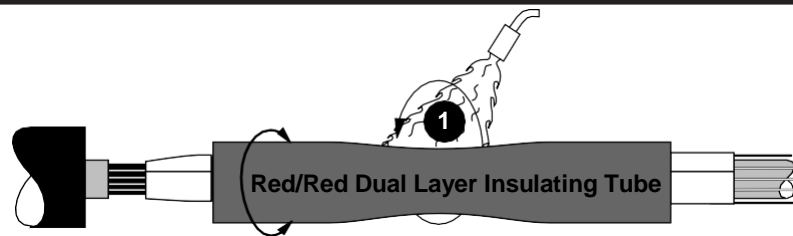
(4) Return to the center and shrink toward the other end, again stopping about 4" (100mm) from the tube end.

(5) Go back to first end and shrink the remaining 4" (100mm) of tube.

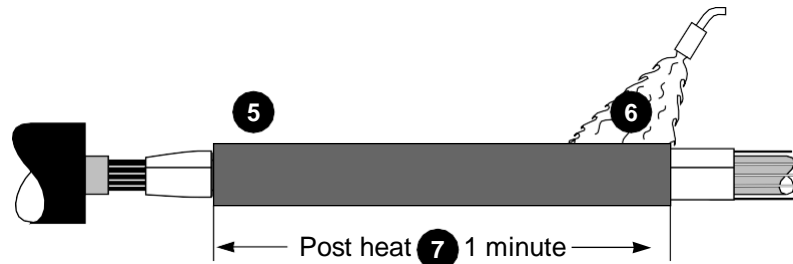
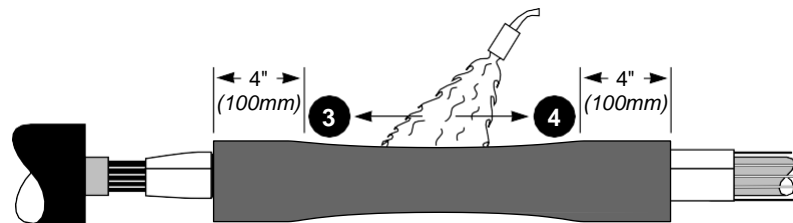
(6) Go back to second end and shrink the remaining 4" (100mm) of tube.

(7) After completing these steps, heat entire tube for approx. 1 minute.

Note: (8) The raised ridges should disappear. Absence of ridges can be observed by visual inspection and by feeling surface with a gloved hand.



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



7 Post heat 1 minute

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

Installation Instructions

15. Position Black/Red Dual Layer tube; shrink in place.

Note: The dual layer insulating/shielding tube takes longer to shrink than previous tubes.

Center tube over joint.

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

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

(3) Shrink from the center toward one end and stop about 3" (75mm) from the end of the tube.

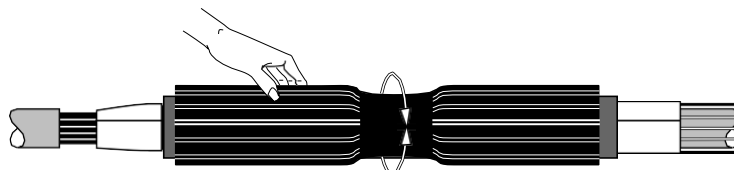
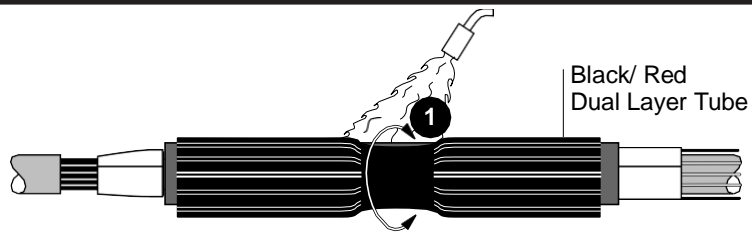
(4) Return to the center and shrink toward the other end, again stopping about 3" (75mm) from the tube end.

(5) Go back to first end and shrink the remaining 3" (75mm) of tube.

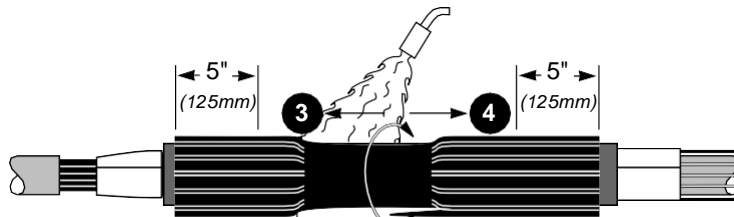
(6) Go back to second end and shrink the remaining 3" (75mm) of tube.

(7) After completing these steps, heat entire tube for approx. 1 minute.

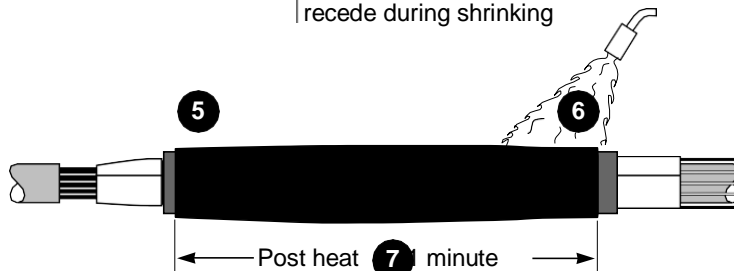
Note: (8) The raised ridges should disappear. Absence of ridges can be observed by visual inspection and by feeling surface with a gloved hand.



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



3 Raised ridges will recede during shrinking



4 Post heat **7** minute

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

1379

16. Remove aluminum deflectors.



1379b

17. Install sealant, mesh, and connect grounds.

Choose the cable type (Choices 1-3) and follow the directions given.

CHOICE 1

Wire Shield and Jacketed Concentric Neutral cable

Go to Choice 1 on Page 9.

CHOICE 2

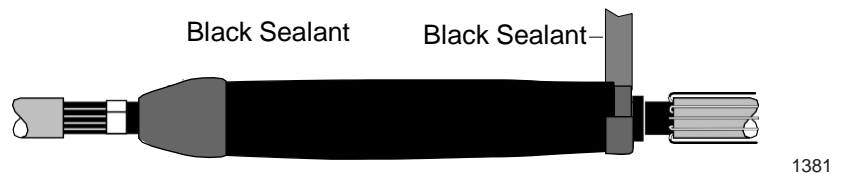
Lead Sheath cable

Go to Choice 3 on Page 11.

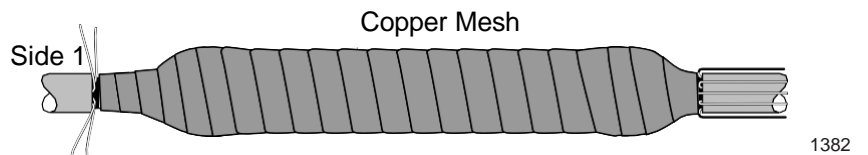
CHOICE 1

Wire Shield and Jacketed Concentric Neutral cable

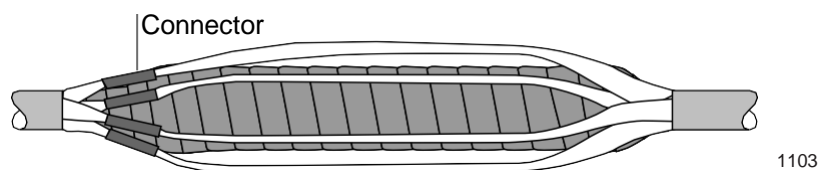
Remove the backing strips from the black sealant. Apply sealant to smooth out the steps at the sleeve ends as shown. **Note:** Be careful not to overlap shield wires.



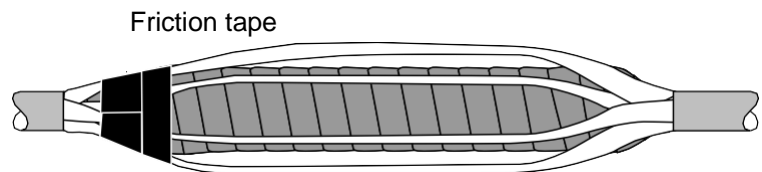
Bend the metallic shield wires back on side 1 as shown. Wrap a half-lapped layer of copper mesh across the entire splice butted up to the metallic shield wires on both sides and tie off.



Bind the shield wires into two or more equal strands. Join the strands with appropriate crimp connectors.



Cover the crimp connectors with friction tape.



Go to Step 18, Page 11.

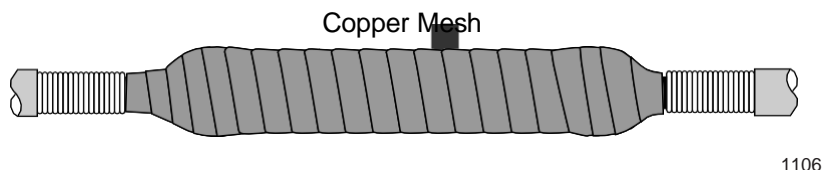
CHOICE 2

Metallic Tape, Longitudinally Corrugated (LC) Shield cable

Remove the backing strips from the black sealant. Apply sealant to smooth out the steps at the sleeve ends as shown. Apply sealant onto semi-con being careful not to overlap onto the metallic shields.



Wrap a half-lapped layer of copper mesh across the splice butted up to the metallic shield on both sides and tie off.

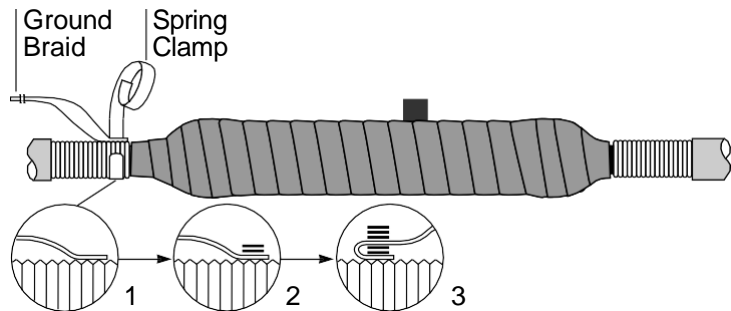


Choice 2 continued on Page 10.

CHOICE 2 (continued)

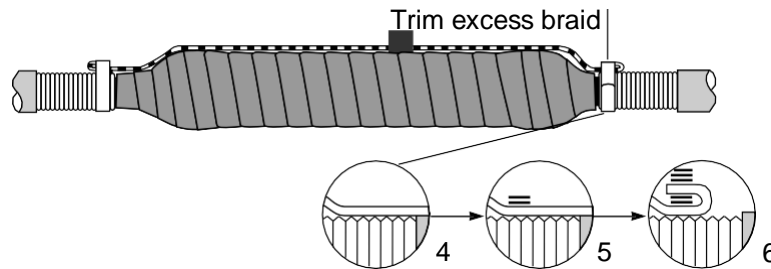
Metallic Tape, Longitudinally Corrugated (LC) Shield cable

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



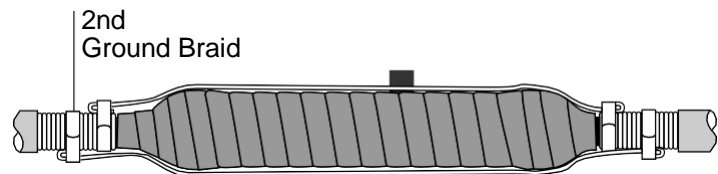
1339

(4) Lay the braid across splice tube and onto metallic shield on other side of the splice. (5) Make two wraps of the clamp over braid. (6) Fold braid back toward the splice and finish wrapping clamp. Tighten and secure. Cut off excess braid.



1339a

Place another ground braid on the metallic shield opposite the installed braid. Follow steps 1-6 above placing the spring clamps outside the previously installed spring clamps as shown.



1340

Go to Step 18 on Page 11.

CHOICE 3

Lead Sheath cable

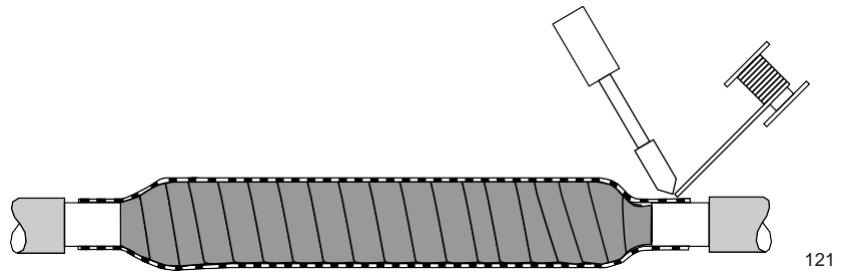
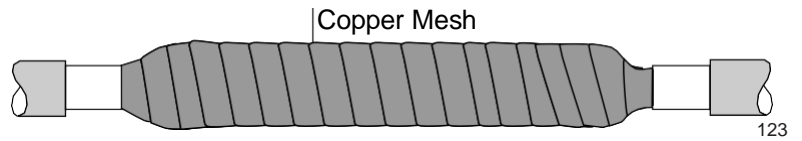
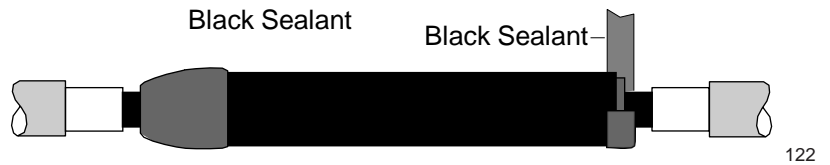
Remove the backing strips from the black sealant. Apply sealant to smooth out the steps at the sleeve ends as shown.

Note: Be careful not to overlap the lead sheaths.

Wrap a half-lapped layer of copper mesh across the entire splice butted up to the lead sheaths on both sides and tie off.

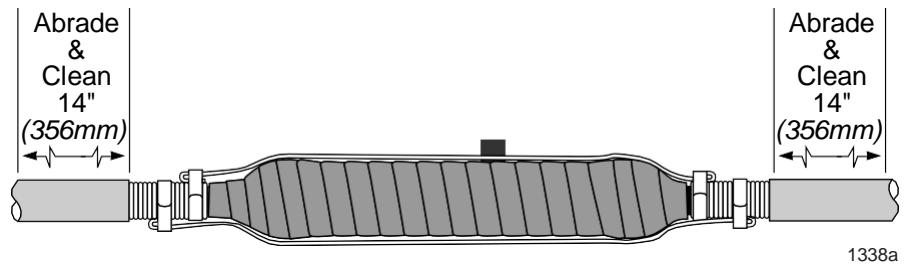
Solder ground braids to lead sheath as shown.

Continue with Step 18.



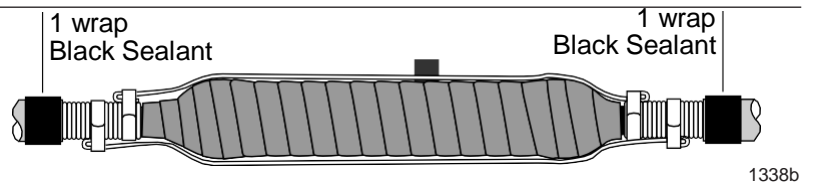
18. Clean & abrade cable jackets.

Abrade cable jackets and clean with an approved solvent.



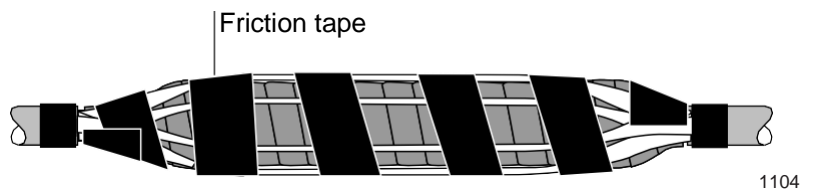
19. Apply black sealant.

Apply one wrap of black sealant starting at the jacket cutbacks around both cable jackets as shown.



20. Apply friction tape.

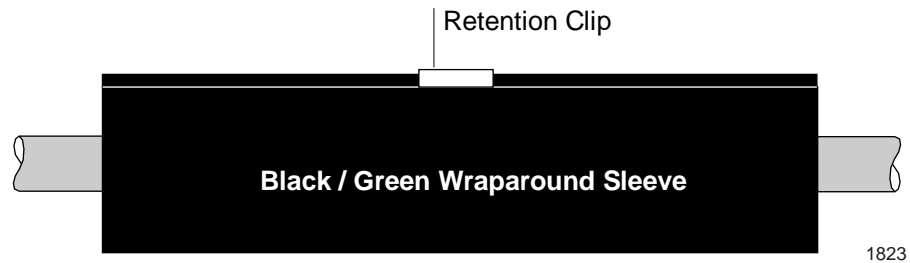
Apply a wrap of friction tape as shown to hold the drain wires/ground braid(s) in position.



Installation Instructions

21. 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.

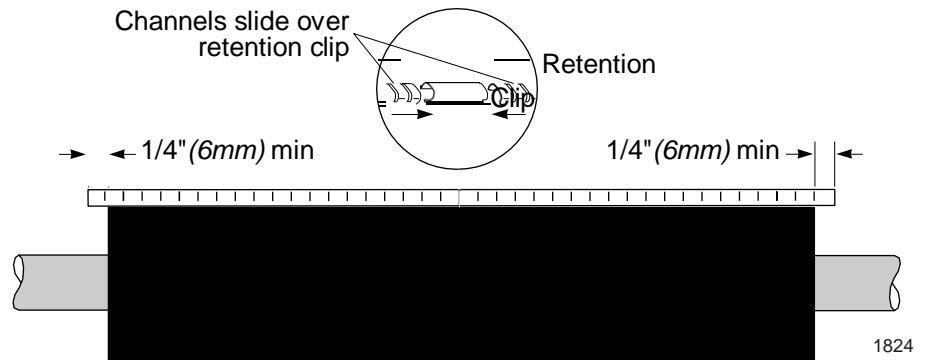


22. Install channels.

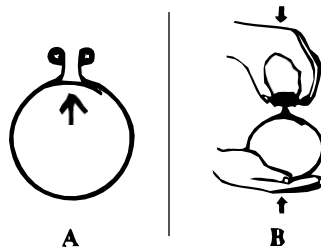
Slide channels onto the rail. Connect the channels by having them overlap the retention clip(s) as shown at right.

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

If channels slide on easily go to step 23, page 13. If channel fit seems tight, continue with next paragraph.

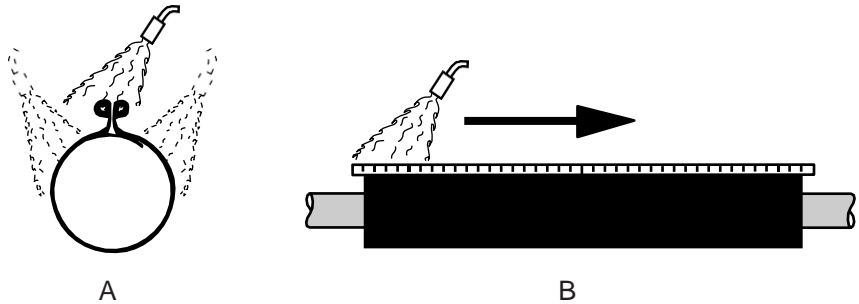


As shown in illustration A, make sure flap is not pinched between the rails. Push the sleeve up from the bottom and down from the top while sliding on channel as shown in illustration B. The idea is to flatten the rails together to prevent the channels from binding.



23. 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.

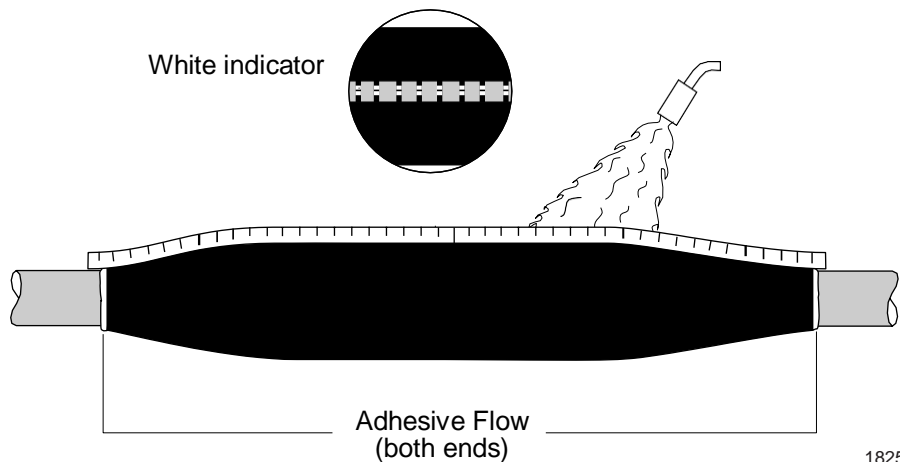


Begin shrinking at the center of the sleeve and work toward each end. Apply heat until the sleeve is fully shrunk and the heat-sensitive green paint is completely converted to black. Continue heating the rail/channel area for another 5 seconds per foot. A white line should be visible in the channel gaps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