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## Cold-Applied Buried Splice Closure

### 1.0 General Product Information

This practice provides information regarding the installation of CommScope' GS3 1650 cold-applied buried splice closure system. The GS3 1650 splice closure system provides a fast, simple way to seal and encapsulate telephone cable splices in non-pressurized, buried cable.

GS3 closure sealing sheet material is composed of several layers of specially blended polymers and gels, and an aluminum moisture vapor barrier layer. The outer compression wrap provides excellent mechanical strength and provides superior protection from forces such as impact and abrasion.

### 2.0 Warnings

The alcohol cleaning tissue in this kit is FLAMMABLE. Keep away from heat and open flame.

### 3.0 General Installation Notes

1. Use temporary bonding procedures where required.
2. The GS3 1650 closure should be installed when the temperature in the work area is above 0°F (-18°C).
3. The GS-3 maintenance kit is required for pressurized applications.

Note: Contact your CommScope Sales Representative for GS3 1650 kits capable of handling pressurized plant.

4. Do not place the GS3 1650 closure on a wet splice. Thoroughly dry the splice in accordance with your company-approved practices. Be sure that no water comes in contact with the splice during installation.
5. Use only company-approved connectors and bonding hardware.
6. Follow the encapsulant manufacturer's instructions for mixing and using the encapsulant.
7. Remove rocks and sharp objects from the backfill when burying the splice. The GS3 1650 closure needs no permanent support attached.

## 4.0 Kit Components

The GS3 1650 closure kit contains the following components:

- 1 bond bar
- 1 inner liner
- sealant strips for UDS
- cleaning tissue(s)
- tie wraps
- 3 gel end seal strips
- 1 gel sealing sheet
- roll(s) compression wrap
- 1 compression wrap clip
- 1 large tie wrap to secure branch cables

Additional components for GS3 1650 closure kits size B and up:

- 2 gel plug strips for branch applications

Optional components for branch/butt splice:

- sealant apple core small
- sealant apple core large

See Section 13.0 for instructions on using the apple core as an optional replacement for the sealant strips supplied in this kit.

## 5.0 Size Selection Chart

Use this chart to select the appropriate size GS3 1650 buried splice closure kit:

Splice Closure Size	Max. Splice Opening (In.)	Approx. Dia. (In.)	Cable Range* (Pairs)	Approximate Amount of Encapsulant Required*
S	12.0	1.10	6 - 25	500 grams
A	12.0	2.20	25 - 100	750 grams
B	12.0	3.75	100 - 300	2,250 grams
A2	21.0	2.20	25 - 200	1,500 grams
AA	9.0	2.20	25-100	500 grams
B2	21.0	3.75	200 - 400	3,000 grams
C2	21.0	5.30	600 - 900	5,000 grams
D2	24.0	7.10	900 - 2400	10,000 grams
A4	37.0	2.20	25 - 400	2,250 grams
B4	37.0	3.75	200 - 600	4,500 grams
C4	37.0	5.30	600 - 1800	9,000 grams
D4	37.0	7.10	900 - 3600	15,000 grams

\* Cable range and encapsulant required will vary depending upon cable type, gauge, connector type, and splice configuration.

## 6.0 Splice Preparation

1. Clean the cable sheath with a clean cloth and company-approved cleaning solution.
2. Use the inner-most holes on the supplied bond bar as a guide to mark the sheath, then make the appropriate sheath opening. Leave 1/2" of Mylar core wrap beyond each sheath opening. (Figure 1)

**Note:** Do not use vinyl tape to protect the pairs.

3. For dual-jacketed cable, leave 1" of the inner cable jacket and the Mylar core-wrap extending beyond the outer cable jacket.
4. Install an approved cable bond clamp (not supplied in the kit) and the supplied bond bar in the sheath opening.



Figure 1

Mylar is a trademark of Dupont Teijin Films.

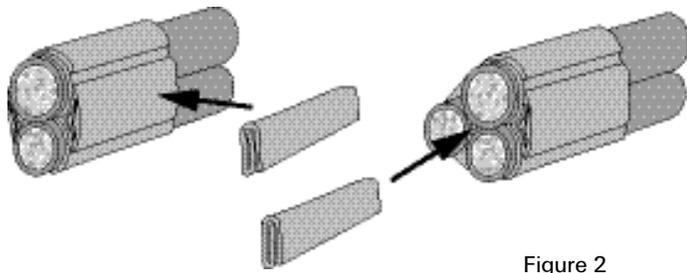


Figure 2

**Note: If the sheath must be tabbed, tape over the bottom of the clamp, but do not tape the edge of the shield or jacket. If no tabbing is required, do not tape the bond clamp.**

5. Bond the branch cables to the main cable using an approved bond strap (not supplied in the kit). Cut off the excess bond stud and file away any remaining sharp edges.
6. Remove the Mylar binder markers, replacing them with loosely installed tie wrap binder markers.
7. Complete the splice work using approved connectors. Support the spliced groups with one or two loosely applied tie wraps. Position tie wrap heads away from the top of the bond bar.
8. To select the appropriate size GS3 1650 splice closure, measure the diameter of the splice at its largest point.

**NOTE: For Sheath Repair, see section 14.0.**



Figure 3

## 7.0 General Installation

1. Place 1-1/4 laps of sealant around each cable, butting the sealant against the end of the bonding hardware.
2. For branch ends, cut and fold two 2" strips of sealant. Press the branch cable sealant collar against the main cable sealant collar, then place one folded strip on each side of the branch area as shown. Compress the sealant to eliminate voids. If you have 3 cables out, arrange them in a triangle shape, and be sure to place a folded strip of sealant in the middle of the triangle. (Figure 2)

**Note: If using apple core sealant, refer to Section 13 for installation instructions.**

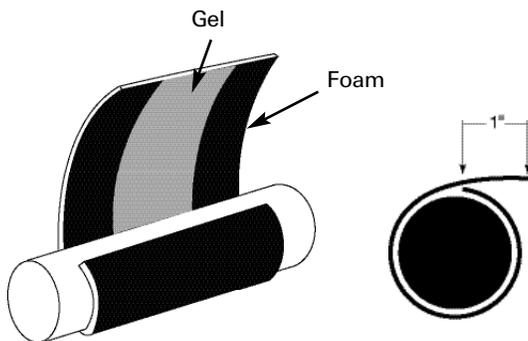


Figure 4A

3. Clean about 10" of cable sheath on each side of the sheath opening with the supplied cleaning tissue.
4. Wrap the gel end seal strips around each cable 1" beyond the splice wrap collar. (Figure 3) Use 1 complete wrap plus an additional 1" overlap. (Figure 4A) Vinyl tape may be used to hold in place. Tape only on outer edges as shown in Figure 4B.

**Note: For GS3 closure sizes B and above, branch cable ends require the use of additional gel to provide adequate seal. Refer to the following step.**

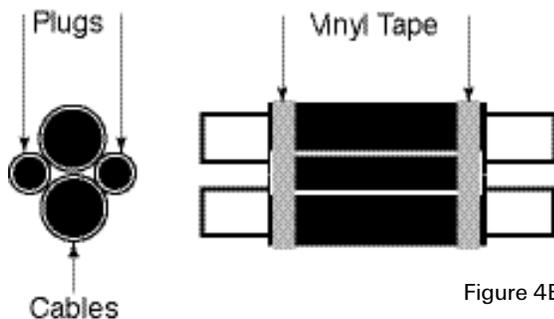


Figure 4B

5. For branch ends, gel plugs are required in addition to gel seal applied in step 4. Use the smallest diameter cable to determine cut length of gel strip to use. The length of gel is equal to the cable circumference plus 1". (Figure 4A)

Roll gel strip as small as possible and position as shown. Use vinyl tape to hold in place. (Figure 4B) If you have 2 branch cables position the cables in a triangle. Use the smallest diameter cable of adjacent cables to determine length of gel strip.

**Note: Use large tie wrap to secure branch cable(s) to main cable 6" outboard of gel end seal**

6. If an external ground wire is required, strip 8" of insulation from the ground wire (not supplied in the kit) and attach the ground wire eyelet to the bonding hardware. Press the ground wire into the sealant collar and cover the wire with a second lap of sealant. The diameter of the sealant collar should not exceed the Maximum Splice Diameter as shown in the Size Selection Chart. Cut a 2" strip of gel end seal and place over the top of the ground wire where it crosses the gel collar. Use vinyl tape to hold in place.
7. Center the inner liner around the splice bundle and overlap the ends of the mesh at least 1/2". Secure the mesh with the supplied tie wraps. (Figure 5)
8. Leaving at least 1/2" of sealant collar exposed, pull the wrapper tight against the collar. Twist the edges of the wrapper several times and press the wrapper into the sealant collar.
9. Leaving 1/2" of sealant collar exposed, secure the wrapper with two laps of tightly wrapped vinyl tape. Repeat Steps 8 and 9 for the other end of the splice opening. (Figure 6)
10. The approximate amount of encapsulant required for each size of the closure is indicated in the Size Selection Chart. Mix the encapsulant according to the manufacturer's directions. Fill the splice to the top of the mesh liner.

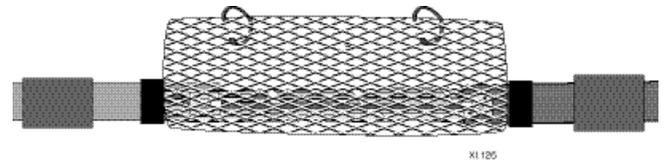


Figure 5

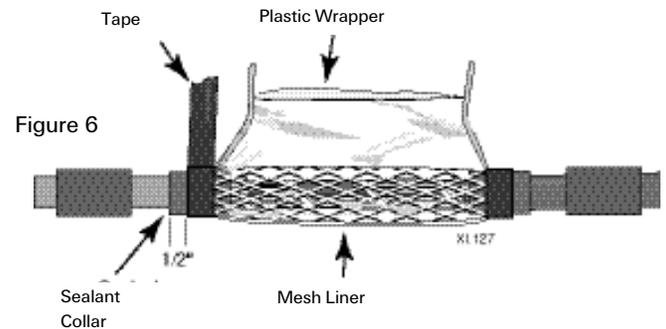


Figure 6

**Note: For larger splices it may be necessary to pull the wrapper up against the splice to determine the proper encapsulant level.**

11. Massage the splice bundle for about one minute, allowing the encapsulant to penetrate to the core of the splice.
12. Pull out the top corners of the wrapper and roll the wrapper down onto the top of the encapsulated splice bundle. Twist one end of the wrapper tightly against the sealant collar and secure it in place with vinyl tape, leaving 1/2" of the sealant collar exposed. Fold the excess wrapper back over the tape and secure it in place with an additional wrap of vinyl tape. (Figure 7)
13. Force air out of the encapsulated bundle through the free end of the wrapper. Twist and tape the remaining end of the wrapper as in Step 12.
14. Starting at one sealant collar, loosely wrap the encapsulated bundle with one half-lapped layer of 3-mil splice wrap. At the opposite sealant collar, twist 6" of the splice wrap to form a cord, and tightly wrap the cord around the sealant collar. (Figure 8)

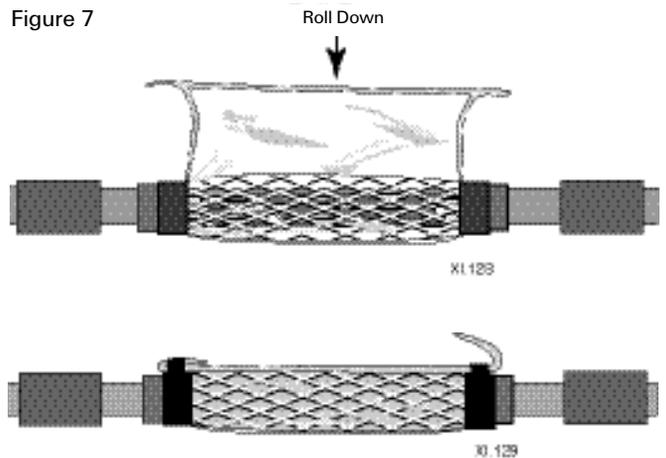


Figure 7

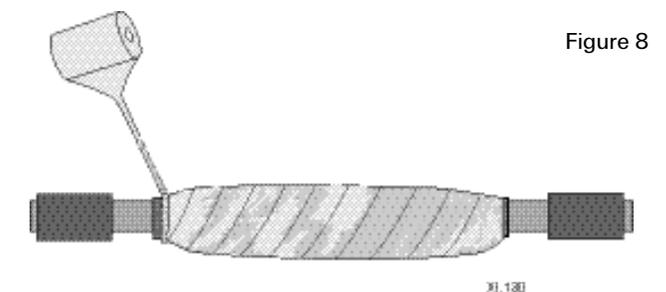


Figure 8

**Note: Be sure to start and end the cord wrap on the sealant collar.**

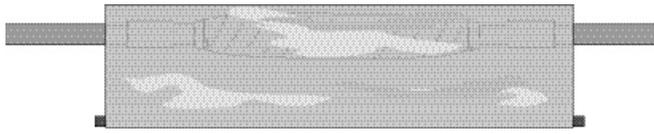


Figure 9

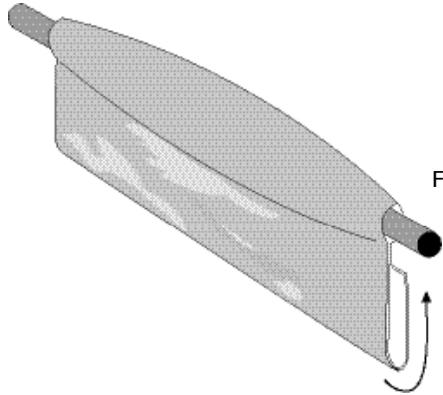


Figure 10A



Figure 10B

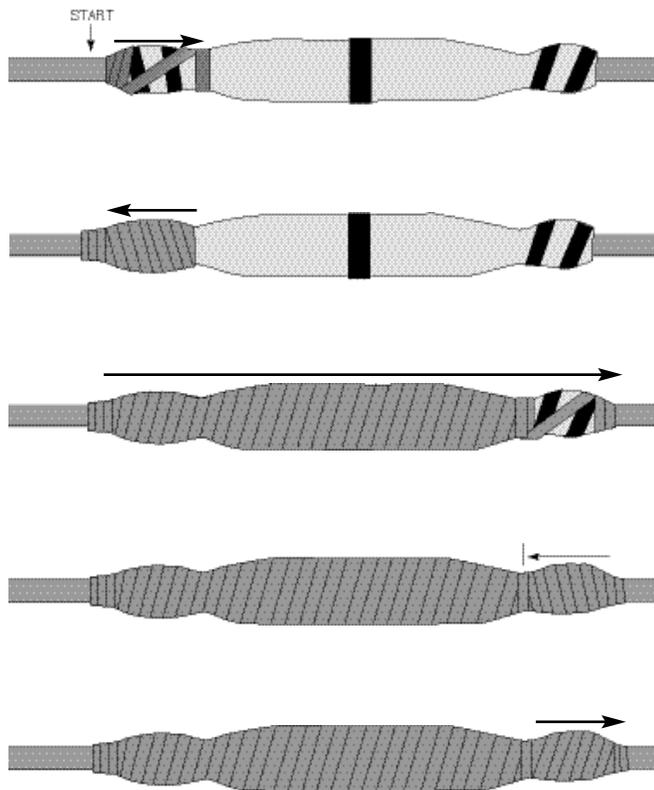


Figure 11

15. Working toward the other end of the splice bundle, repeat Step 14, creating a second loosely wrapped layer of splice wrap around the bundle.
16. To remove trapped air, puncture the splice wrap and work the air out of the bundle through the puncture. Seal the hole with several layers of splice wrap.
17. Tightly wrap five layers of 3-mil splice wrap around the encapsulated bundle. If the splice wrap breaks, resume wrapping below the break.
18. If a leak occurs in the splice, wrap over the leak with more splice wrap. If a leak occurs at the sealant collar, create a cord of splice wrap and apply it at the sealant collar as directed in Step 14.
19. Center the gel sealing sheet over the splice and drape it over the splice so that equal amounts of the sheet hang down on either side.
20. Remove the backing paper from both ends of the sheet and press the exposed sticky portions of the sheet together as smoothly as possible. (Figure 9)
21. Starting in the center of the gel sheet fold the excess of the sheet up against the splice, use one lap of vinyl tape to hold in place. (Figure 10A) Wrap vinyl tape around the cable gel seal area on both sides of the closure as shown. (Figure 10B)
22. Starting 2" beyond the sheet, begin wrapping the compression wrap around the splice in half-lapped layers. Stretch the wrap as much as possible while wrapping the splice. If you notice air trapped under gel sheet, squeeze out by hand toward end of closure. Two half-lapped layers of compression wrap must be applied to each cable gel seal area, as shown in illustrations (Figure 11).

**Note: Some kits contain more than one roll of compression wrap. To continue another roll, wrap one full lap over the end of the previous compression wrap. Continue half laps.**

23. Continue wrapping until the compression wrap extends at least 2" past the end of the sheet. Use the enclosed clip to secure the compression wrap. Wrap two laps of compression wrap over the clip and lock in place. (Figure 12) Cut off excess compression wrap 2" from the clip.
24. The installation is complete, and the splice can now be buried.

## 8.0 Screened Cable Splicing

1. Prepare the splice as directed in Section 6.
2. Loosely wrap perforated aluminum foil around one group of conductors and secure it in place with a tie wrap. (Figure 13)
3. Perform all steps in Section 7 to complete the splice.

## 9.0 Vertical Placement

1. Prepare the splice opening as directed in Section 6. Perform Section 7, Steps 1 through 6 to create sealant and gel collars at each end of the splice bundle.
2. Center the inner liner around the splice bundle and overlap the ends of the mesh at least 1/2". Secure the mesh with the supplied tie wraps.
3. Leaving at least 1/2" of sealant collar exposed, pull the wrapper tight against the bottom collar. Twist the edges of the wrapper several times and press the wrapper into the sealant collar.
4. Leaving 1/2" of the bottom sealant collar exposed, secure the wrapper with two laps of tightly wrapped vinyl tape.
5. Roll the edges of the wrapper onto the splice bundle, forming a cylinder. Tape the cylinder in place at the top and the center to prevent it from unrolling.
6. Twist the bottom end of the wrapper tightly against the sealant collar and secure it in place with vinyl tape, leaving 1/2" of the sealant collar exposed. Fold the excess wrapper back over the tape and secure it in place with an additional wrap of vinyl tape.
7. Starting at the bottom sealant collar, loosely wrap the splice bundle with two half-lapped layers of 3-mil splice wrap. (Be sure to leave a gap at the top so that encapsulant can be poured in.)
8. The approximate amount of encapsulant required for each size of the closure is indicated in the Size Selection Chart. Mix the encapsulant according to the manufacturer's directions. Fill the splice to the top of the mesh liner.
9. Massage the splice bundle for about one minute, allowing the encapsulant to penetrate to the core of the splice.
10. Twist the top end of the wrapper tightly against the sealant collar and secure it in place with vinyl tape, leaving 1/2" of the sealant collar exposed. Fold the excess wrapper back over the tape and secure it in place with an additional wrap of vinyl tape.

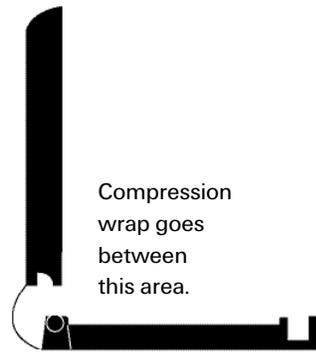


Figure 12

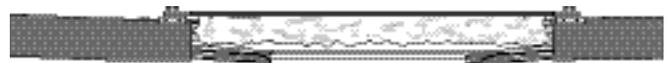


Figure 13

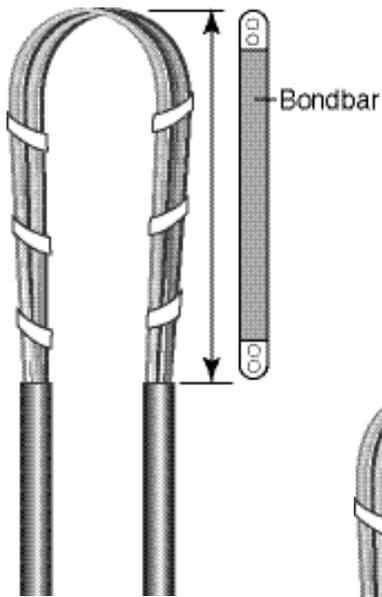


Figure 14

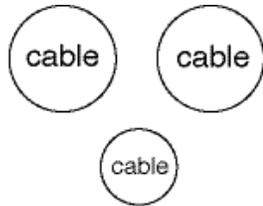


Figure 15

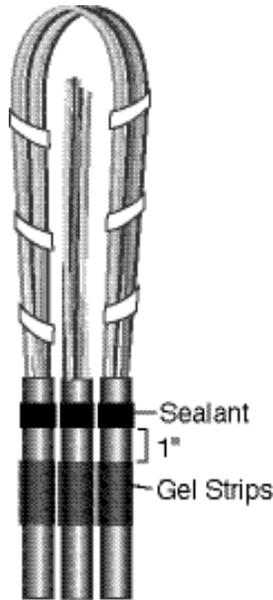


Figure 16

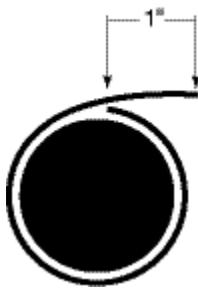


Figure 17A

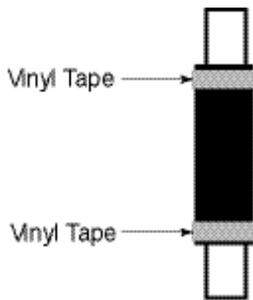


Figure 17B

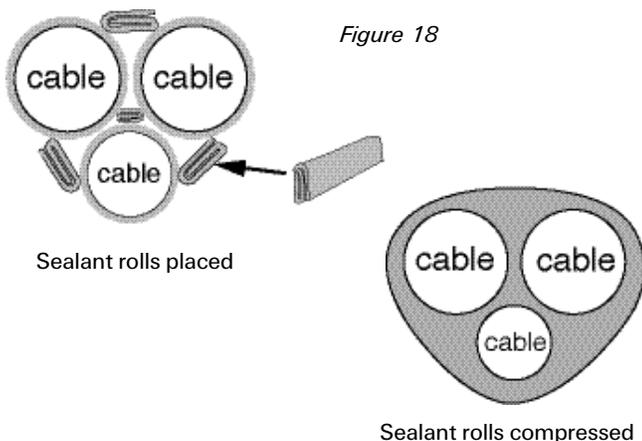


Figure 18

- Starting at the top sealant collar, loosely wrap the splice bundle with two half-lapped layers of 3-mil splice wrap. At the top sealant collar, twist 6" of the splice wrap to form a cord, and tightly wrap the cord around the sealant collar.

**Note:** Be sure to start and end the cord wrap on the sealant collar.

- Tightly wrap five layers of 3-mil splice wrap around the encapsulated bundle. If the splice wrap breaks, resume wrapping at the point of the break.
- Perform steps 19 through 23 of section 7 to complete the splice.

## 10.0 Butt Splicing Instructions

- Remove cable sheath and shield from the cable. Use supplied bond bar as a guide to determine splice opening. See Figure 14.
- Bond the cables with approved bond strap (not supplied in the kit). Cut off the excess bond stud and file away any remaining sharp edges. Complete splice work.
- Clean all cable jackets with the cleaning tissue.
- Place 1-1/4 laps of sealant around each cable, butting the sealant against the end of the bonding hardware.

**Note:** If you have three cables, arrange them in a triangle shape. See Figure 15.

**Note:** If using optional apple core sealant, refer to Section 13.

- Wrap the gel end seal strips around each cable 1" beyond the sealant collar. (Figure 16) Use one complete wrap plus an additional 1" overlap. (Figure 17A) Vinyl tape may be used to hold in place. Tape only on outer edges as shown in Figure 17B.
- Cut and fold 2-inch pieces of sealant as required. Place sealant rolls into the voids between the cables. Tightly compress all cables together by hand to eliminate any other voids. See Figure 18.
- Place a final wrap of sealant around the sealant collar and compress.

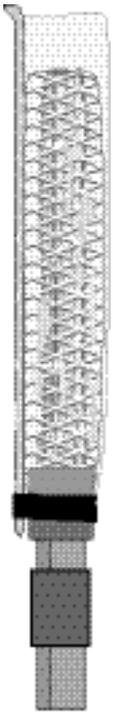


Figure 19

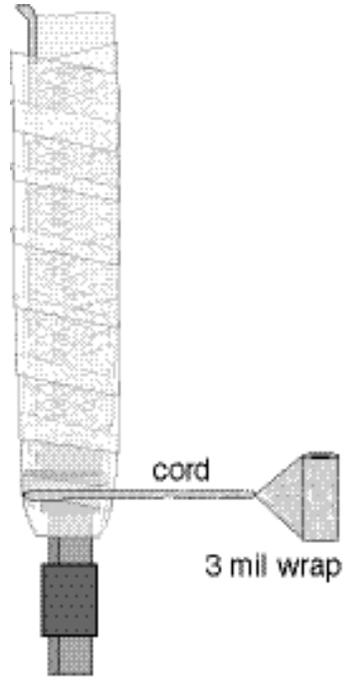
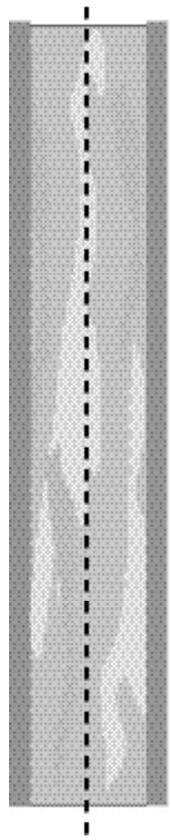


Figure 20

8. Center the inner liner around the splice bundle and overlap the ends of the mesh at least 1/2". Secure the mesh with the supplied tie wraps.
9. Leaving at least 1/2" of sealant collar exposed, roll the wrapper down to the sealant collar forming a cylinder. (Figure 19)
10. Secure the wrapper with two laps of tightly wrapped vinyl tape. (Figure 19)
11. Starting at the bottom sealant collar, loosely wrap the splice bundle with two half-lapped layers of 3-mil splice wrap. (Be sure to leave a gap at the top so that encapsulant can be poured in.) At the bottom sealant collar, twist 6" of the splice wrap to form a cord, and tightly wrap the cord around the sealant collar. Continue with two wraps of splice wrap around collar, cut and tape in place. (Fig. 20)
12. Fill the splice to the top of the mesh liner. Massage the splice bundle for about one minute, allowing the encapsulant to penetrate to the core of the splice.
13. Twist the top end of the wrapper tightly, fold over and secure with vinyl tape.
14. **Starting 1" below sealant collar**, tightly wrap one half-lapped layer of 3-mil splice wrap to the top of the encapsulated bundle. Wrap several tight wraps over the top. Continue with four additional tight half-lapped wraps around the encapsulated bundle.
15. To form gel bag, fold gel sheet over itself widthwise and remove release paper. See Figure 21.

Fold in half



Remove backing paper to form bag

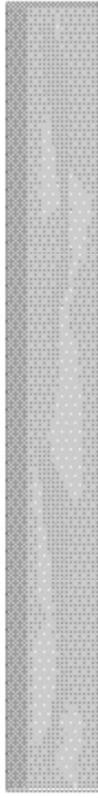
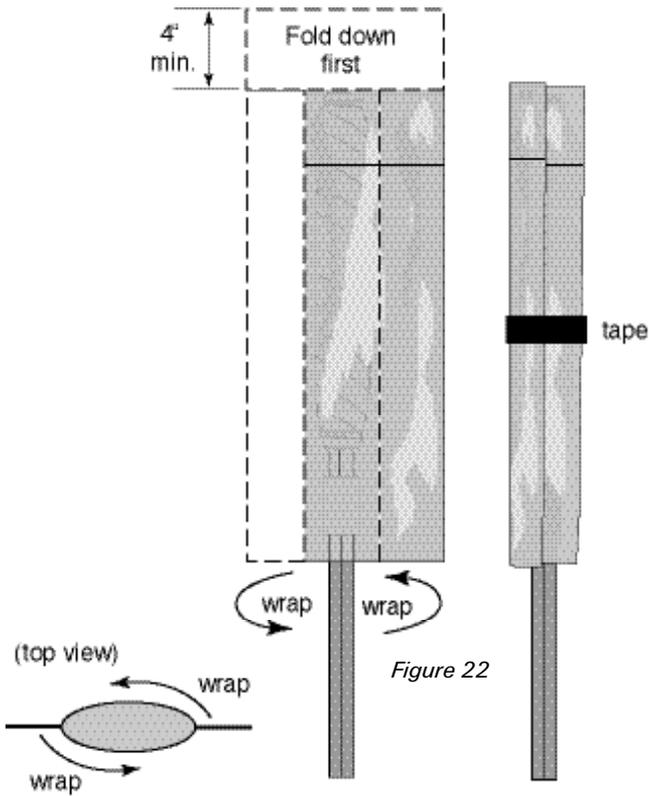


Figure 21



16. Place gel bag over encapsulated bundle making sure that the bag extends a minimum of 1" past the gel strips and 4" above top of encapsulated splice. (See Figure 22)
17. Fold excess gel bag as shown in Figure 22 and tape in place.
18. Cut two or more 6" strips of compression wrap. Form an "X" on top of bag and tape in place. See Figure 23.
19. Starting at the top of the gel bag, begin wrapping the compression wrap around the splice in half-lapped layers. Wrap the compression wrap 1" past the bottom of the gel bag and continue back to the top, stopping 4" past the gel strips. Stretch the wrap as much as possible while wrapping the splice. See Figure 24.
20. Use the enclosed clip to secure the compression wrap. Wrap two laps of compression wrap over the clip and lock in place (Figure 25). Cut off excess compression wrap 2" from the clip.

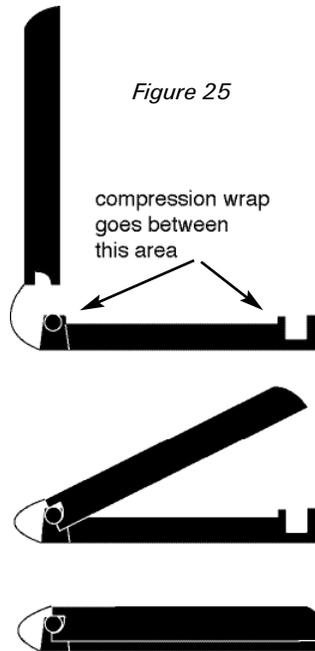
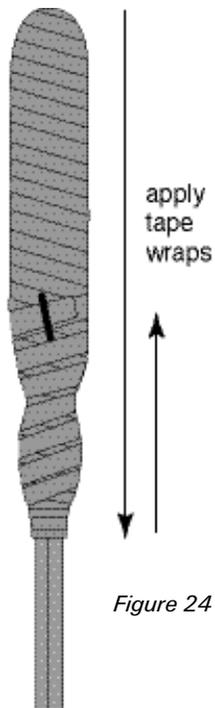
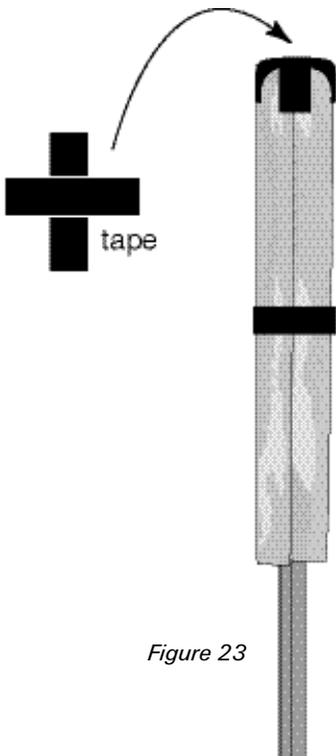


Figure 26

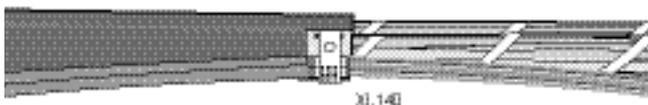
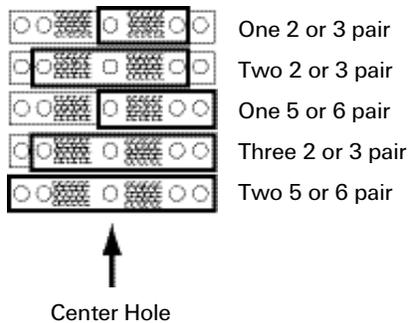


Figure 27



Figure 28

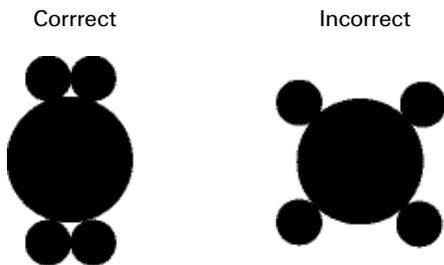


Figure 29

## 11.0 Service Wire Termination

1. Prepare the splice as directed in Section 6, Steps 1 through 5. Do not trim off the excess bond stud at this time.
2. Prepare the service wires by removing 14-1/2" of the outer sheath. Remove all but 1" of the exposed ground shield. Remove all but 1/2" of the exposed Mylar core wrap.
3. The GS3 splice closure system will accommodate up to eight service wires. Distribute an equal number of service wires on each side of the splice opening if possible. If it is necessary to bring more than two service wires out either side, an additional bond clamp must be installed opposite (180° from) the first bond clamp in the main cable. Trim service wire shield connectors as shown according to the size or quantity of service wires to be bonded. (Fig. 26)
4. Place the shield connector's center hole on the bond clamp stud with the perforated points facing outward.
5. Place the exposed metal shield of the service wire onto the shield connector. Fold the connector over and secure it with a washer and nut. The service wire jacket should end 1/4" from the edge of the shield connector. (Fig. 27)
6. Complete the wire work as described in Section 6, Steps 6 and 7. Remove excess bond studs and file away any sharp edges.
7. Clean the cable with a dry cloth. Wrap one lap of sealant around the cable. The sealant should be at least 1/4" from the edge of the service wire jacket.
8. Press one service wire into the first lap of sealant. Wrap the sealant over the first service wire, then under the second service wire. Continue over-and-under wrapping on all service wires. Place a final layer of sealant over all service wires. Compress the sealant to form a collar.
9. Clean about 10" of cable and service wire sheath on each side of the sheath opening with the supplied cleaning tissue.
10. Wrap the gel seal strips around each cable and service wire 1" beyond the splice wrap collar. Use 1 complete wrap plus an additional 1" overlap for the cables and 1-1/4 lap for the service wires. Use vinyl tape to hold gel seal strips around service wires. (Figure 28)

**Note: See Figure 29 for correct spacing. Use vinyl tape to hold in position.**

11. Complete the closure as in section 7.0 steps 3 through 23.

## 12.0 Re-Entry

1. Open the clip securing the compression wrap and unravel the wrap from the splice bundle.
2. Locate the tab in the tape at one end of the splice bundle and remove the tape from the sheet. Pull the sticky portions of the sheet apart, and remove the sheet from the splice bundle.
3. Remove the splice wrap from the splice bundle. Locate and remove the tie wraps which hold the inner mesh liner in place.
4. Remove the inner mesh liner from the splice bundle. Remove encapsulant to reveal wire work.
5. To replace the closure, a new GS3 1650 splice closure kit is required.

## 13.0 Optional "Apple Core" Sealant Installation

### 13.1 For 2 cables

1. Place the sealant core between the 2 cables butting the top edge of the sealant core against the end of the installed bonding hardware.
2. If cable diameters allow, fold edges of sealant over cables to form seal. (Fig 30) If cable diameters prevent you from folding the sealant edges together, wrap 1 strip of sealant (provided in kit) starting 1 inch beyond 1 of the cables and wrap around the sealant core and at least 1 inch past the second cable. (Fig 31)
3. Tightly compress sealant core by hand to eliminate any voids.
4. Continue with general installation Section 7.0 Step 3 for branch, or Section 10.0 Step 5 for butt splicing.

### 13.2 For 3 cables

1. Arrange cables in a triangle with the smallest cable in front.
2. Place the sealant core between the 2 larger cables butting the top edge of the sealant core against the end of the installed bonding hardware.
3. If cable diameters allow; fold edges of sealant over cable to form seal around the 2 cables installed in the sealant core's cable openings. If cable diameters prevent you from folding the sealant edges together; leave as is and continue on to next step.
4. Press the 3rd cable into the center of the sealant core. Wrap 1 strip of sealant (provided in kit) around all cables starting 1 inch beyond 1 of the larger cables and Z-fold sealant between larger cables and smaller 3rd cable. Additional 2 inch cut and folded strips of sealant may be needed between large and small cables to eliminate voids (Fig 32)
5. Tightly compress sealant core and cables to eliminate all voids. (Fig 33)
6. Continue with general installation Section 7.0 Step 3. Continue with general installation Section 7.0 Step 3 for branch, or Section 10.0 Step 5 for butt splicing.

### "Apple Core" Sealant Sizing Chart

Size	Main Cable		3rd Cable	
	Dia. Range	Pair Count	Dia. Range	Pair Count
Small	0.45" - 1.60"	25-200	0" - 0.70"	0-50
Large	0.60" - 2.75"	50-900	0" - 1.00"	0-100

Small Cables

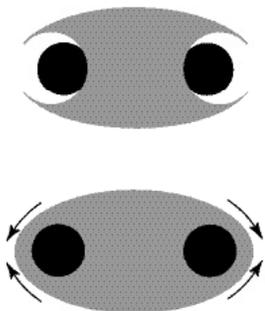


Fig. 30

Large Cables

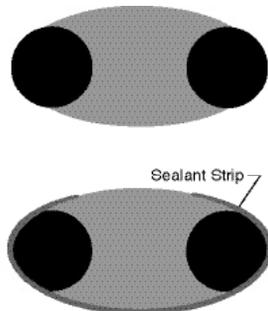


Fig. 31

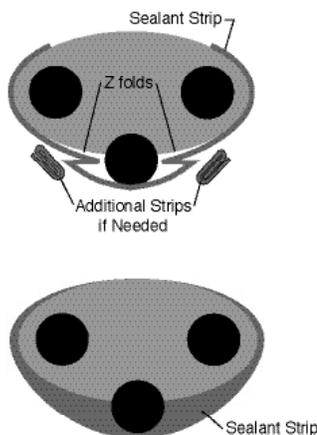


Fig. 32

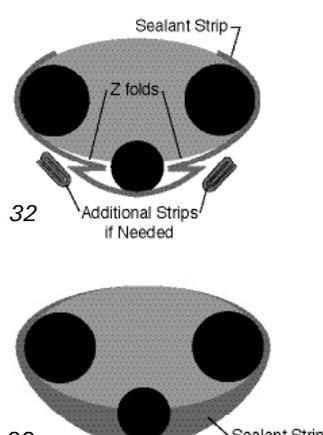


Fig. 33

## 14.0 Sheath Repair Usage

### General Installation on Polyethylene/Lead Sheath Cable: No Sheath Removal

1. In the repair area, trim any badly distorted sheath from the cable. Clean approximately 10" of cable sheath on each side of the repair area with the supplied cleaning tissue.
2. Starting 2" behind the repair area, wrap a single half-lapped layer of 2" DR tape over the damaged part of the cable using minimal tension. Continue wrapping until you are 2" past the repair area.
3. Starting 1" beyond the end of the DR tape, wrap two half-lapped layers of 3-mil splice wrap using minimal tension. Make sure all of the DR tape is covered.
4. Wrap the gel end seal strips around each cable 1/2" beyond the splice wrap.
5. Refer to Section 7.0, step 19.

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