3M™ Cold Shrink QS4 Integrated Splice Kit QS4-25JCN-500-1000

for Jacketed Concentric Neutral (JCN) and Flat Strap Neutral Cable

Instructions

IEEE Std. 404
25/28 kV Class
200 kV BIL

⚠ CAUTION

Working around energized systems may cause serious injury or death. Installation should be performed by personnel familiar with good safety practice in handling electrical equipment. De-energize and ground all electrical systems before installing product.

Kit Selection Table

Kit Number	Cable Insulation O.D. Range	Min. Cable Jacket O.D.	Conductor Size Range
QS4-25JCN-500-1000	1.24"–2.07" (31,5–52,6 mm)	1.78" (45,2 mm)	500-1000 kcmil* (240-500 mm^2)

*Splices (including size transitions) can be made to smaller or larger conductors (but larger conductors may require special neutral handling), provided both cables are within the Insulation O.D. Range and the connector meets the dimensional requirements shown below.

Connector Dimensional Requirements

	Minimum Inches (mm)	Maximum Inches (mm)
Outside Diameter	1.05" (26,7 mm)	2.07" (52,6 mm)
Length Aluminum (Al/Cu) Compression	—	7.50" (191 mm)
Length Copper Compression and 3M™ Shearbolt Connector QCI 500-1000	—	8.25" (210 mm)

July 2016
78-8127-8914-3 Rev C

3M

1.0 Kit Contents

a. 3M Cold Shrink QS4 Integrated Splice Body QS4-25JCN-500-1000 (1 ea.)

b. Constant Force Springs (4 ea.)

c. 3M Red Compound Tubes P55/R (non-silicone grease) (2 ea.)

d. Scotch® Rubber Mastic Tape 2228 Rolls, 2" x 36" (2 ea.)

e. Scotch® Mastic Strips 2230, 6" length (9 ea.)

f. Cold Shrink Adapter Tube (1 ea.*)

g. 3M Cable Cleaning Pads CC-3 (1 ea.)

h. Cut-back Templates (2 ea.**)

i. Wire Brush (1 ea.)

j. Instruction Booklet (1 ea.)

Cold shrink adapter tube may not be included in all kits.
****Kits contain either 1 or 2 cut-back templates as needed per conductor size.***

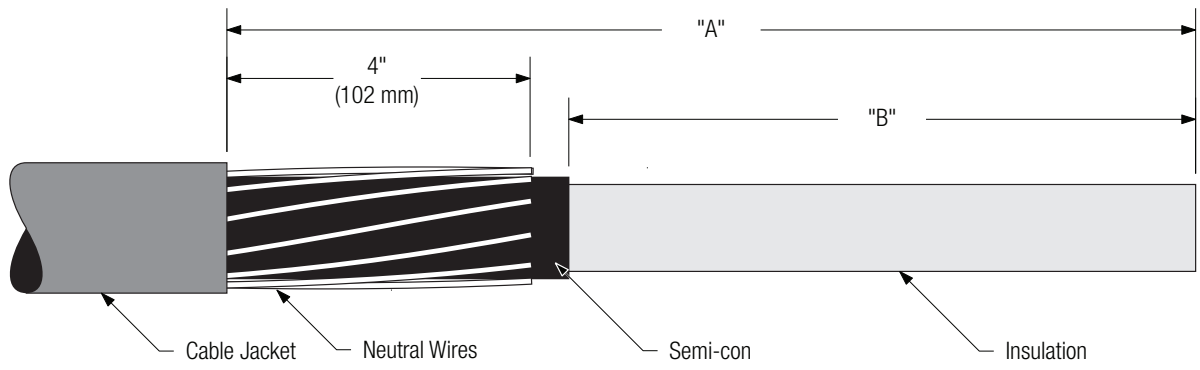
Note: Do not use knives to open plastic bags.

Note: Connector not shown, but if included, it is indicated on the packaging label.

2.0 Prepare Cables

2.1 Check to be sure the cable fits within the kit ranges as shown on the cover page.

2.2 Prepare cables according to standard procedures. Refer to template provided or illustration below for proper dimensions *(Figure 1)*.



Typical Conductor Size* kcmil (mm²)	Insulation OD Range Inches (mm)	Jacket Cutback "A" Inches (mm)	Semi-con Cutback "B" Inches (mm)
500**-750 (240-400)	1.24–1.70" (31,5–43,2)	13 3/4" (349 mm)	9 1/4" (235 mm)
1000** (500)	1.59–2.07" (40,4–52,6)	13 1/4" (337 mm)	8 3/4" (222 mm)

*For 100% and 133% insulation levels, Insulation OD is the final determining factor.
**Cables must be within the Insulation OD Range of the splice kit and the connector must meet the dimensional requirements shown on the front page.

Figure 1

2.3 Clean or cover cable jacket 30" (760 mm) from jacket edge on side where splice body will be parked.

2.4 Select a Scotch® Mastic Strip 2230 from the kit and remove white release liners. Using light tension, apply a **single wrap** of mastic at the edge of the cable jacket and partially over the neutral wires. *(Figure 2)*.

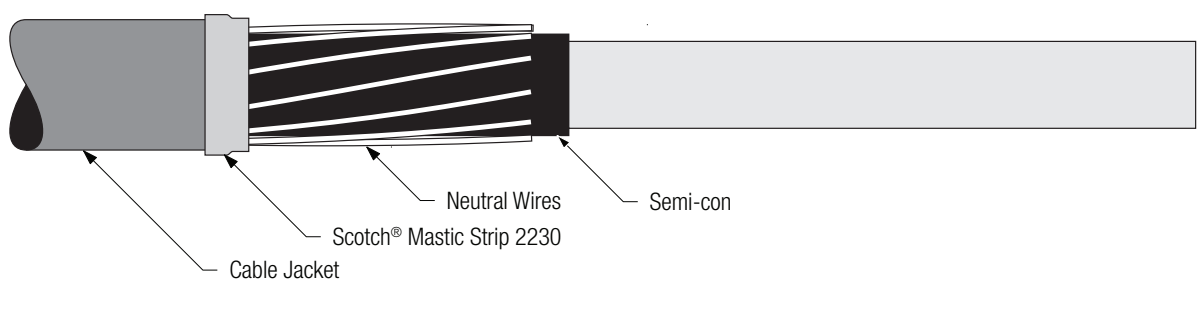


Figure 2

2.5 Carefully bend the cut neutral wires up and away from the cable semi-con. Fold neutral wires over cable jacket, **taking care to keep wire profile low by following the concentric turn in the cable.** Secure the ends of the neutral wires with one wrap of vinyl tape. Fold one Scotch® Mastic Strip 2230 in half lengthwise and apply one wrap only at cable jacket edge under the neutral wires *(Figure 3)*. Knead mastic around neutral wires.

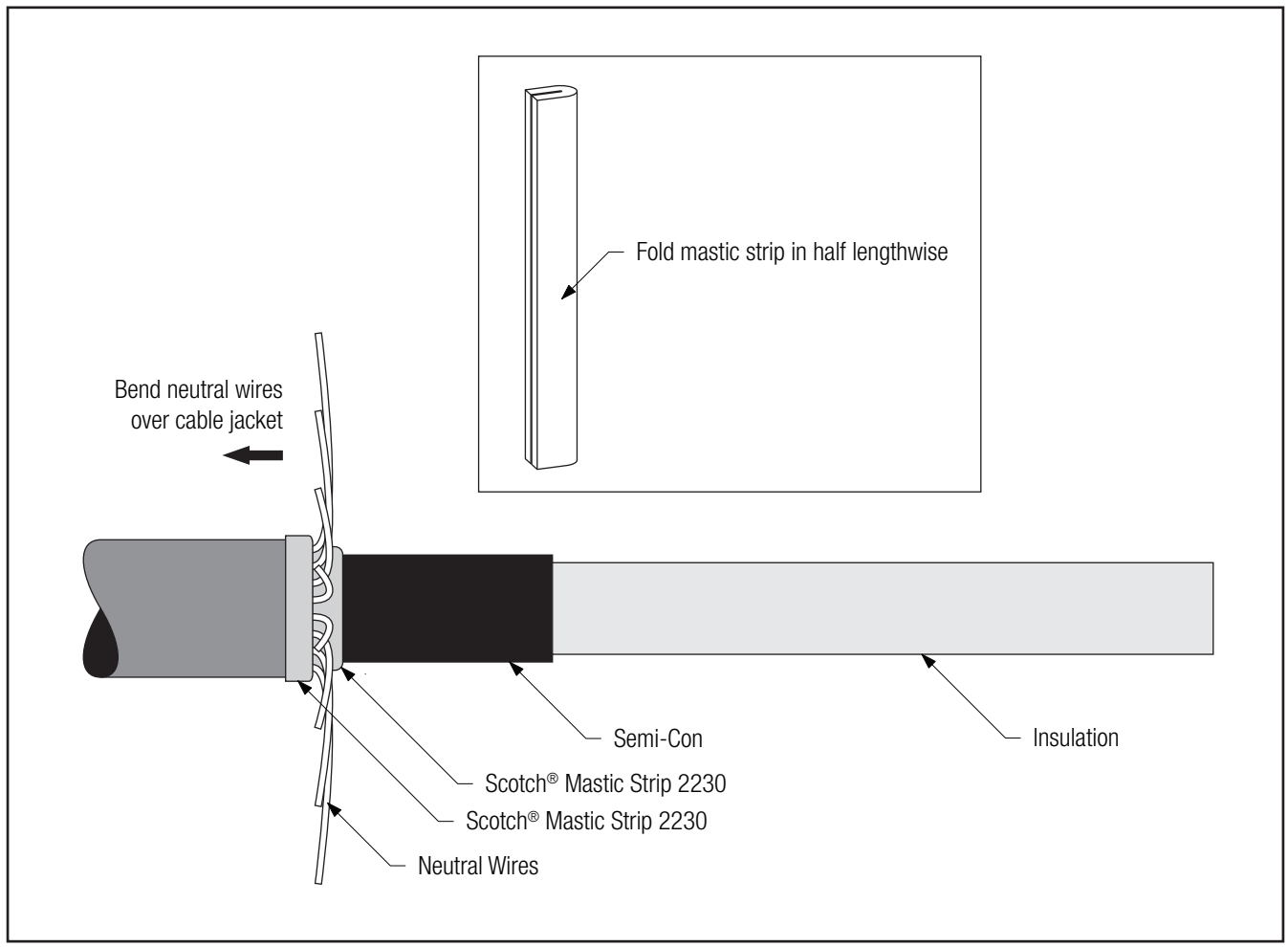


Figure 3

2.6 Apply an additional **single wrap** of Scotch® Mastic Strip 2230 at the edge of the cable jacket and partially over the neutral wires. Overwrap mastic with vinyl tape, taking care not to extend tape along neutral wires *(Figure 4)*.

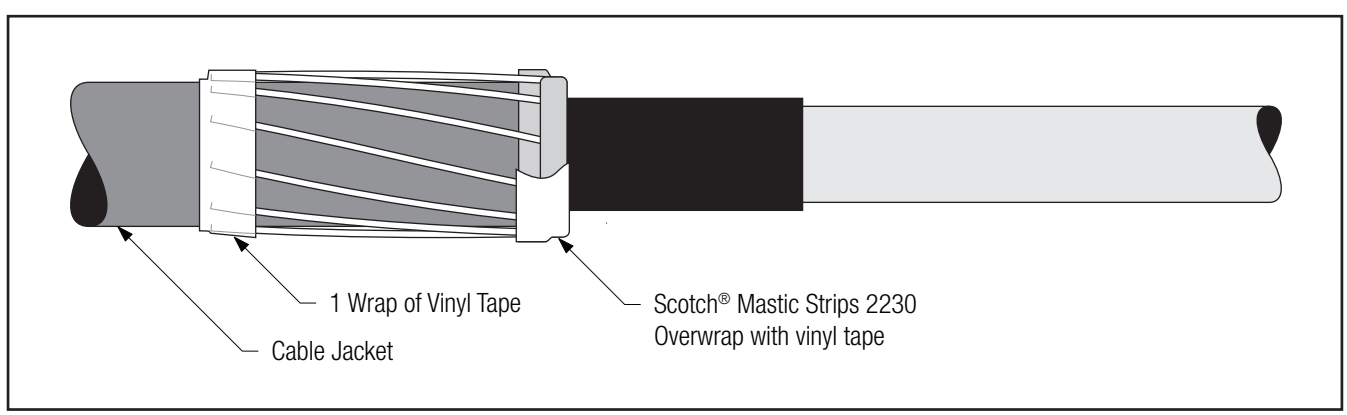


Figure 4

2.7 Slide integrated splice body onto clean cable jacket, loose core end first *(Figure 5)*. If the splice body contains a long built-in ground strap for external grounding, ensure that the long ground strap is on the side of the splice where the external grounding will be located.

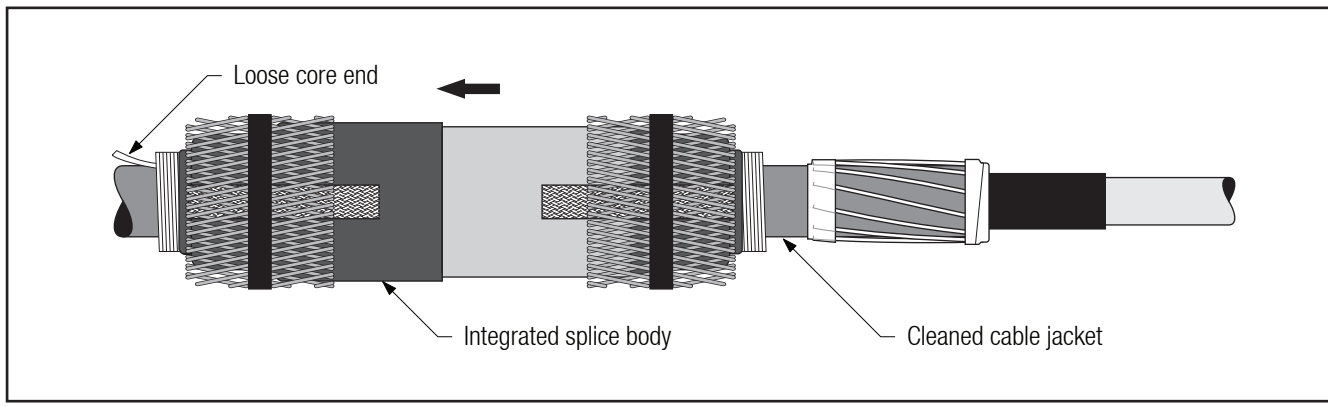


Figure 5

3.0 Install Connector

Note: If using a crimp-type connector, go to step (3.3).

3.1 If using a 3M Shearbolt Connector QCI 500-1000, refer to the instructions included with the connector for insulation cut-back dimension. Insulation removal length shall not exceed 3 3/4" (95 mm) from conductor end *(Figure 6)*.

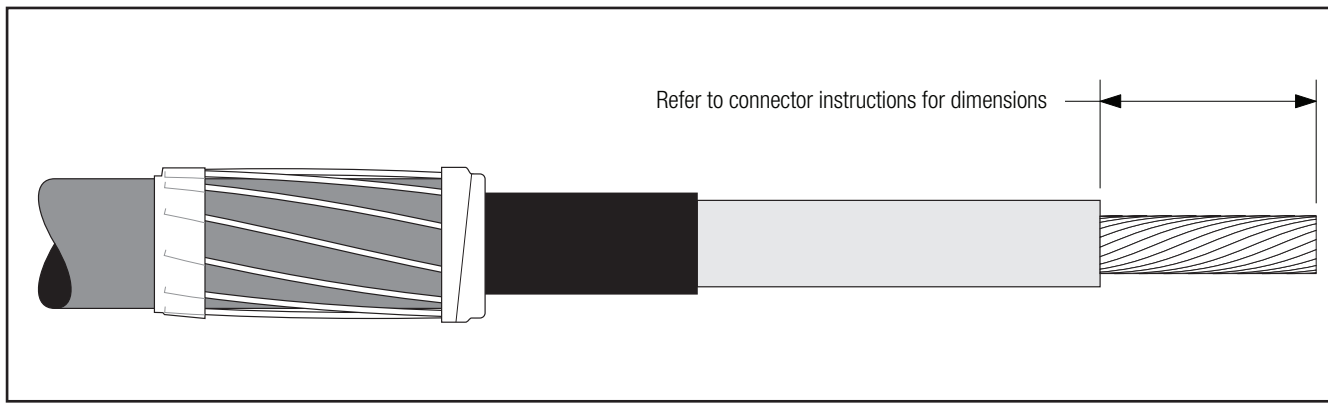


Figure 6

3.2 Install 3M Shearbolt Connector QCI 500-1000 according to the instructions included with the connector *(Figure 7)*.

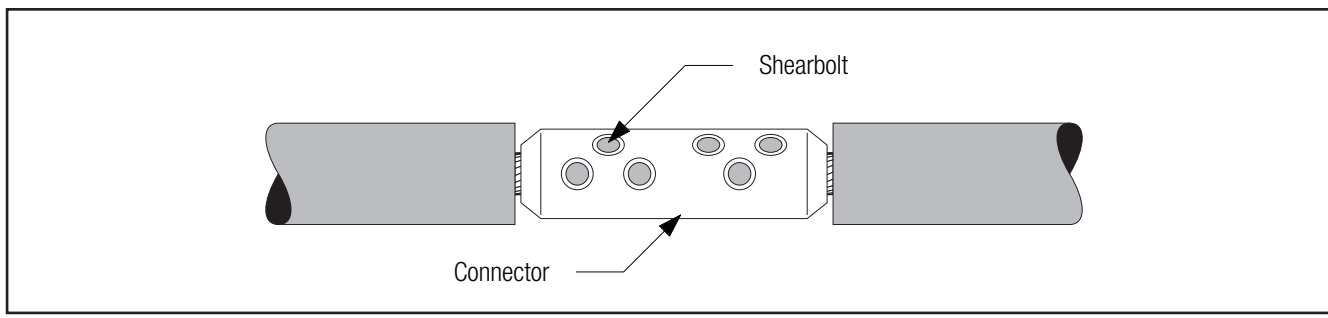


Figure 7

Go to section 4.0 "Install Splice."

3.3 **If using a crimp type connector,** remove cable insulation for 1/2 connector length plus an allowance* for increases in connector length due to crimping. Insulation removal length shall not exceed 4 1/8" (105 mm) from conductor end. **Do not install connector now** *(Figure 8).*

Note: This assumes that the installer has determined the increased length of an aluminum connector crimped with a specific tool and die.

Aluminum (Al/Cu) Crimp Connector Growth Chart

Conductor Size	Typical growth allowance (per end)
500 kcmil	1/4" (6 mm)
750–1000 kcmil	3/8" (10 mm)

Note: 1) Copper connectors do not require a length change allowance.
2) Maximum aluminum connector crimped length allowed is 8.25" (210 mm).

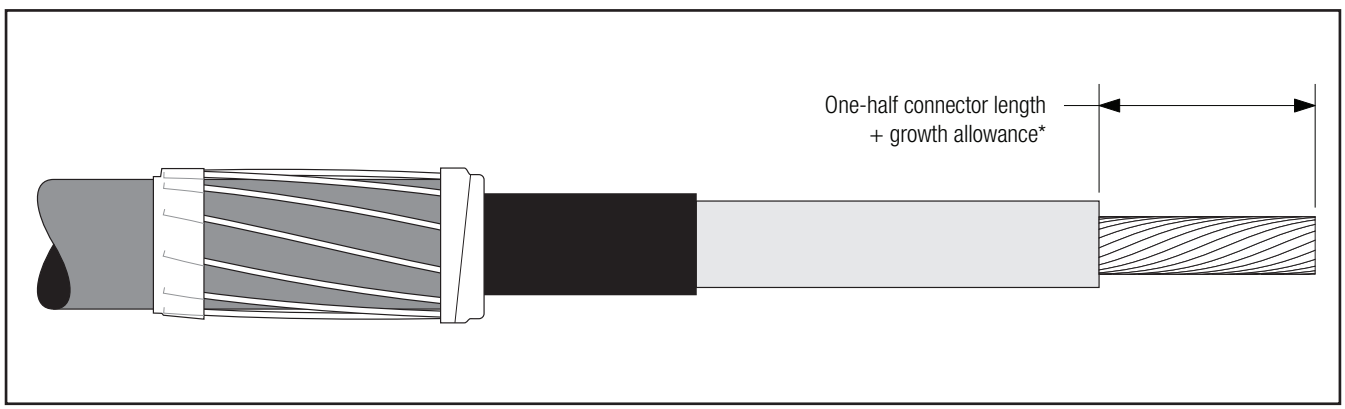


Figure 8

3.4 **For 500 kcmil copper connectors, or connectors with an O.D. between 1.05-1.24" (26,7-31,5 mm):** Park cold shrink adapter tube on cable insulation *(Figure 9).*

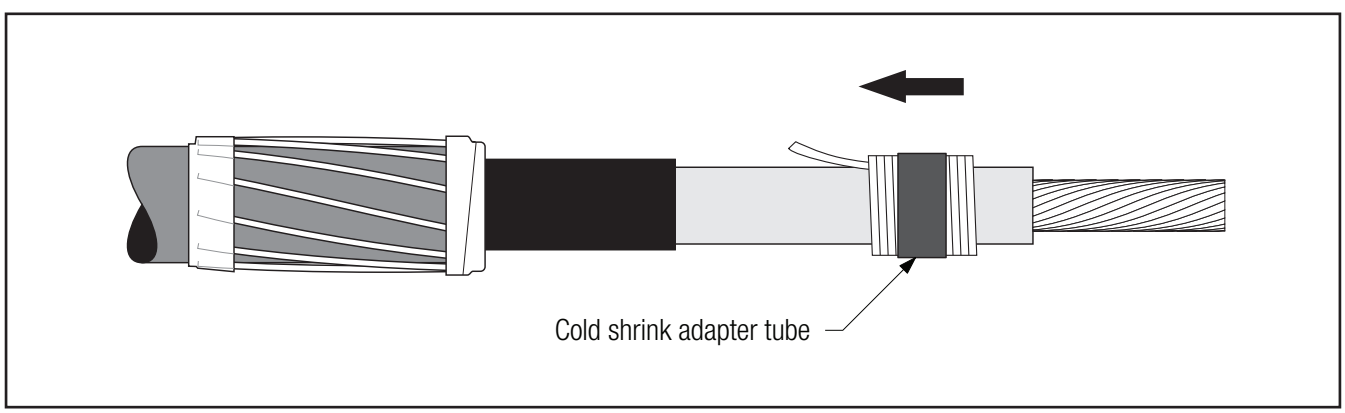


Figure 9

3.5 Install connector. See table (on cover) for proper connector dimensions. (For standard 3M Connectors, refer to table at the end of this instruction for crimping information). If using an aluminum conductor, wire brush aluminum strands and then insert into connector. Remove excess inhibitor compound and remove conductor from connector. Wire brush aluminum strands again. Insert into connector and crimp. Remove any excess oxidation inhibitor from connector ends *(Figures 10 and 11)*. File sharp connector flashing, if necessary, taking care to remove all metal filings from splice area.

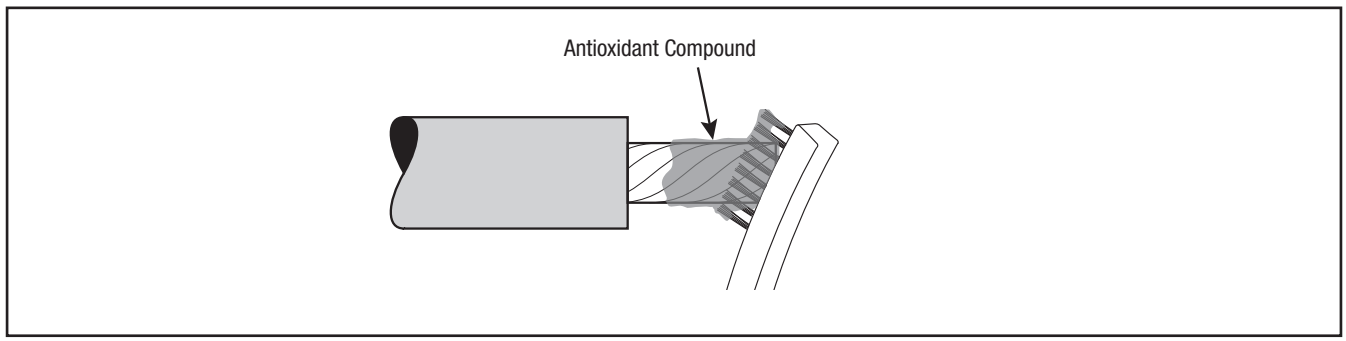


Figure 10

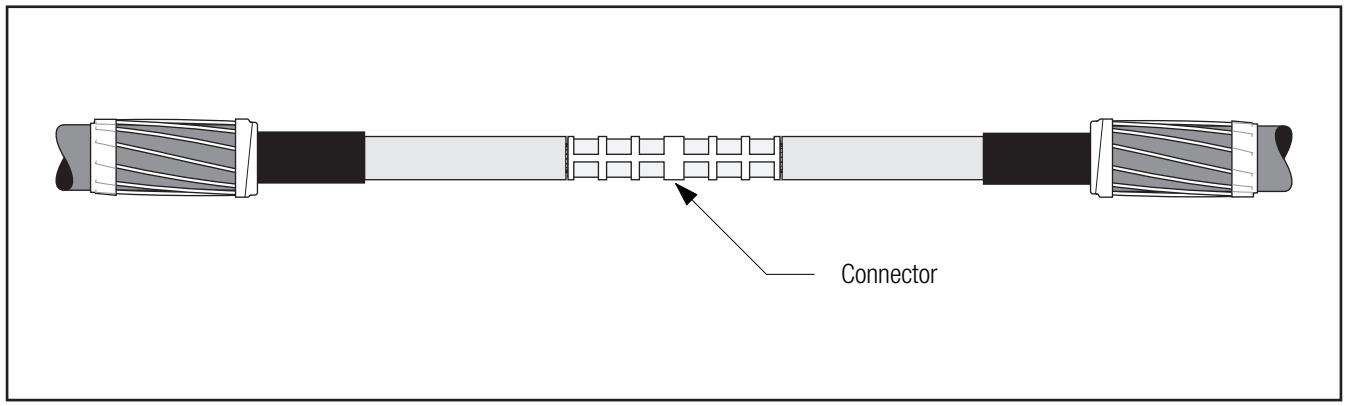


Figure 11

4.0 Install Splice

4.1 Apply a tape marker to semi-con insulation shield on cable which does not contain splice. Measure 11 1/2" (292 mm) from center of connector *(Figure 12)*.

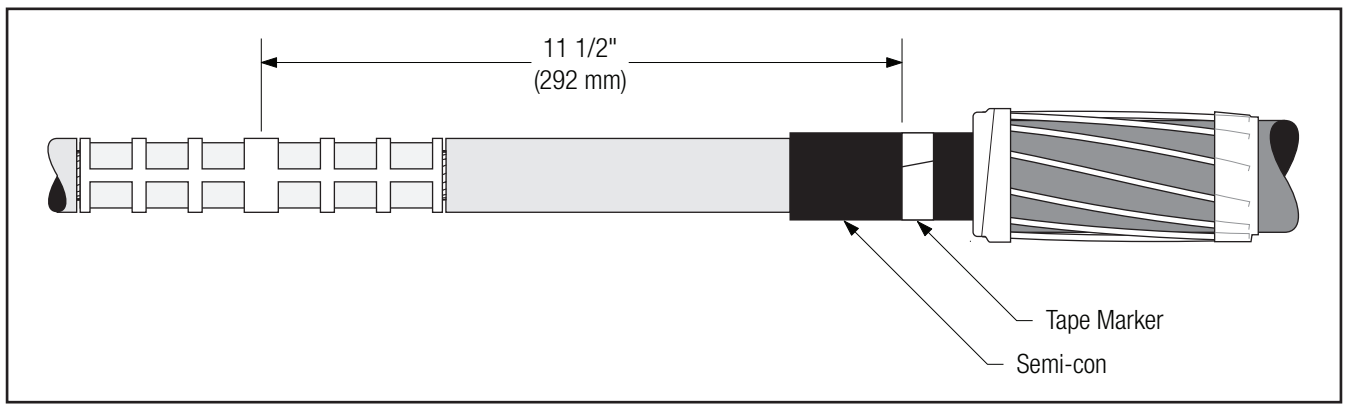


Figure 12

4.2 If using cold shrink adapter tube: Position adapter tube over the connector. Shrink adapter near center of connector by pulling and unwinding the loose core end in a counter-clockwise direction *(Figure 13)*.

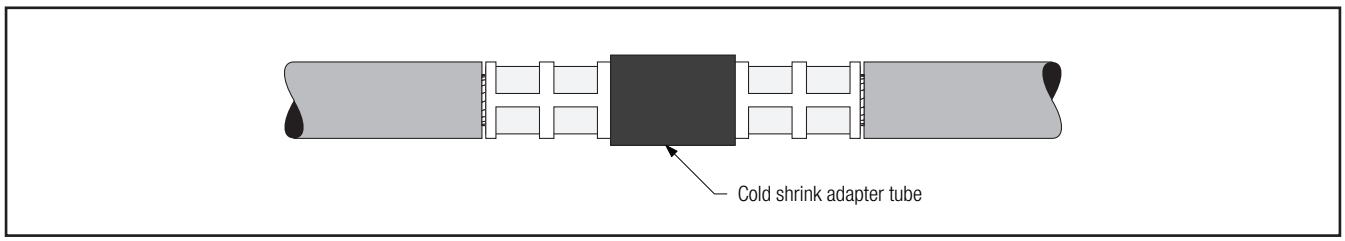


Figure 13

4.3 Clean cables using standard practice:

a. Do not allow solvent or abrasive to contact the cable semi-conductive insulation shield.

b. Do not reduce cable insulation diameter below 1.24" (31,5 mm) specified for the splice.

c. The insulation surface must be round, smooth and free of cuts/voids. Sanding may be necessary, finish sanding should be done with a 120 grit or higher electrical grade abrasive.

d. Make certain that the cable insulation is smooth, clean and dry before continuing.

4.4 Apply 3M Red Compound P55/R on cable insulations, making certain to fill in edge of cable semi-con. **Do not use silicone grease** *(Figure 14)*.

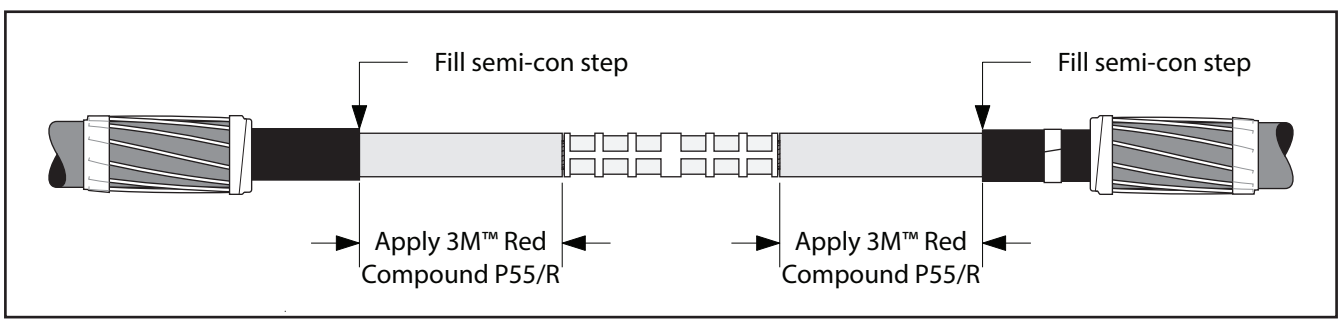


Figure 14

Note: This core installs differently than other cold shrink products.

4.5 Position the splice body over connector area, aligning end of the splice body (not the core) at the center of the tape marker. **Slowly** start to remove the splice core by pulling and unwinding the loose core end counterclockwise, allowing only ¼" (6 mm) of the splice to shrink onto the tape marker. Carefully slide the splice body off the tape marker by pulling and twisting until the entire tape marker is exposed. Continue removing the core to complete the splice body installation *(Figure 15*.

Note: The splice body ends must overlap onto the semi-con of each cable by at least 1/2" (13 mm).

Note: Do not push the splice body toward the tape marker as this may cause the end to roll under. If the end does roll under, DO NOT use sharp-edged tools to pull it out as this could cut and damage the splice.

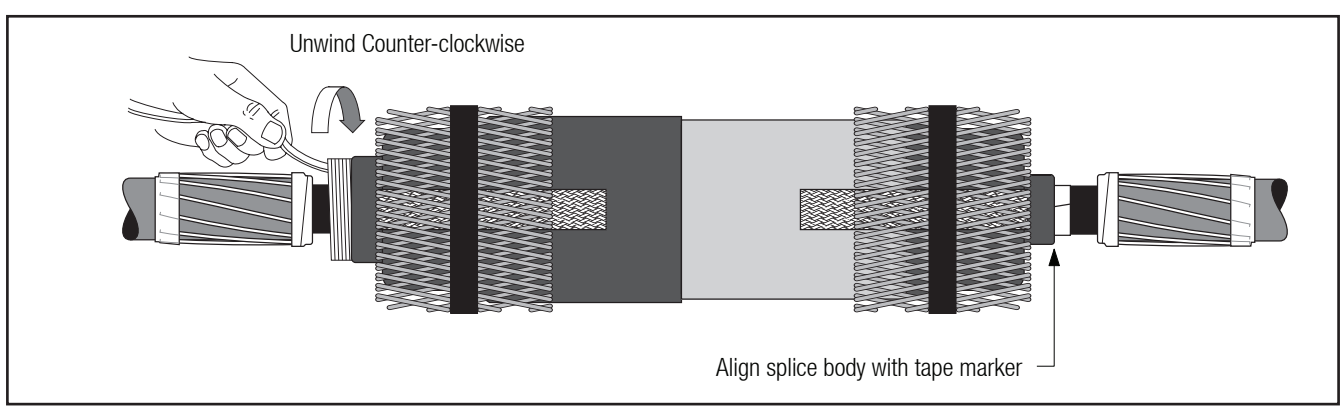


Figure 15

5.0 Connect Shielding

Note: If using a long built-in ground strap for external grounding, go to Step (5.5).

5.1 Remove the vinyl tape holding the shield sleeve on the rejacketing tube, and spread the shield sleeve out toward the cable jacket.

Note: The 3M Cold Shrink Integrated Splice Body includes a pre-installed ground braid for external grounding on either side of the splice body. If not using the ground braid, it may be tied into the ground system with the shield sleeve using constant force springs as shown below.

5.2 Hand-tighten the shield sleeve outward and secure it (along with the ground braid if not grounding externally) to the neutral wires on either side of the splice using two constant force springs on each end between the vinyl tape at the jacket edge and the vinyl tape as shown (Figure 16).

5.3 If shield sleeve extends beyond neutral wires, it may be interwoven with the constant force springs. Trim excess ground braid if needed. Cinch (tighten) the spring after wrapping the final winding *(Figure 16)*.

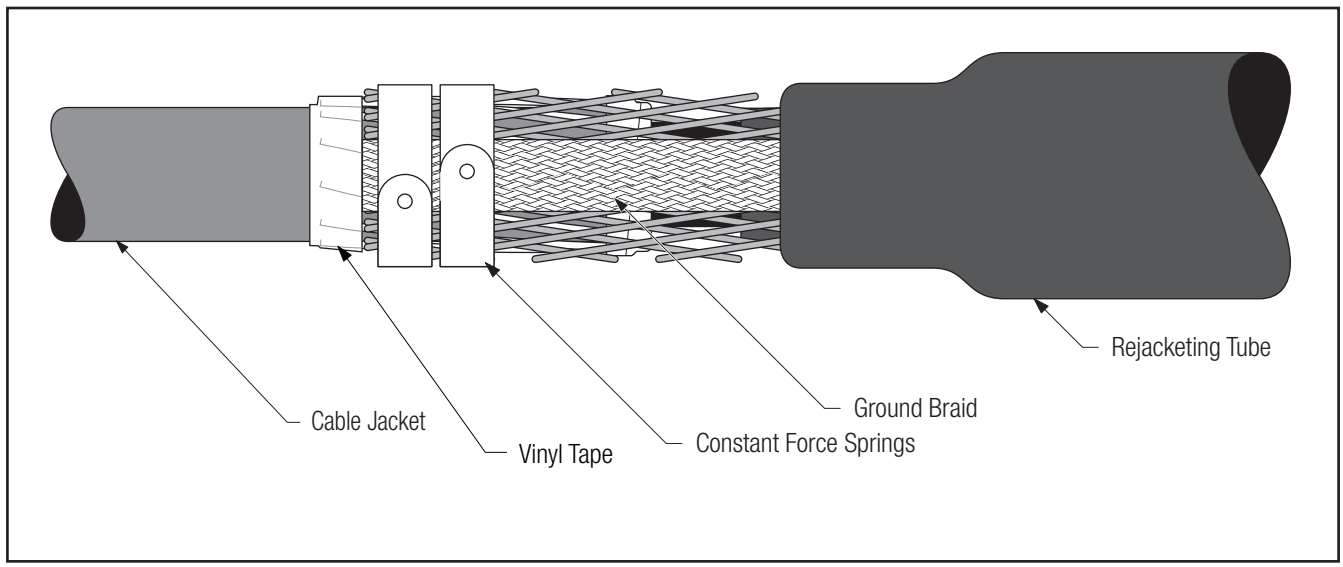


Figure 16

5.4 Wrap two half-lapped layers of vinyl tape over the constant force springs *(Figure 17)*.

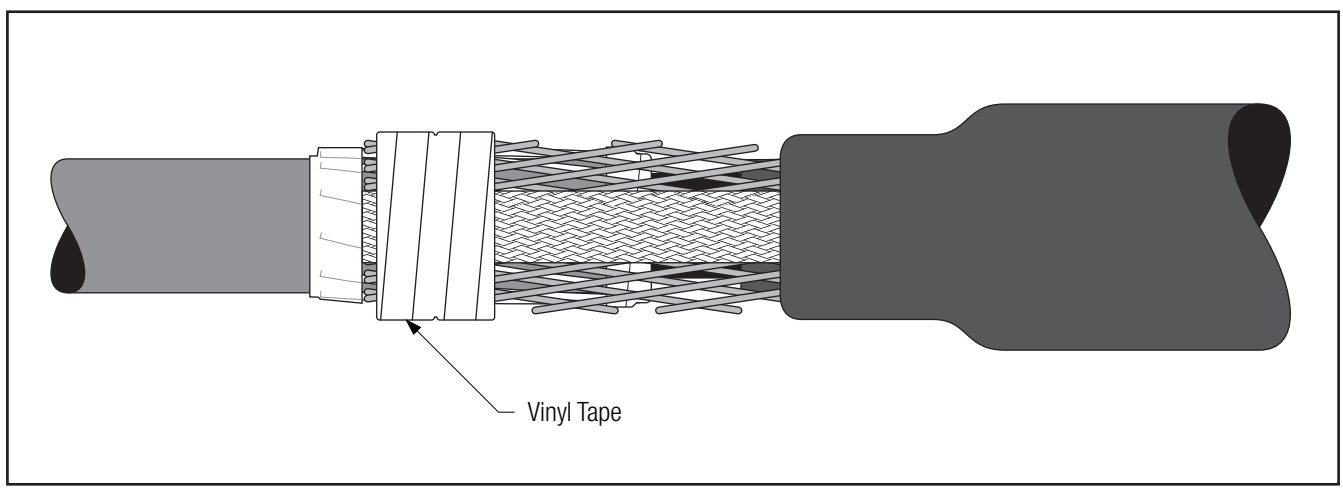


Figure 17

Go to section 6.0 "External Grounding with Ground Wire".

Note: Use these instructions if using a long built-in ground strap for external grounding.

5.5 Remove the vinyl tape holding the shield sleeve on the rejacketing tube, and spread the shield sleeve out toward the cable jacket.

5.6 Hand-tighten the shield sleeve outward and secure it (along with the ground braid) to the neutral wires on either side of the splice using two constant force springs on each end between the vinyl tape at the jacket edge and the vinyl tape as shown *(Figure 18)*.

5.7 If shield sleeve extends beyond neutral wires, it may be interwoven with the constant force springs. Trim excess ground braid if needed. Cinch (tighten) the spring after wrapping the final winding (Figure 18).

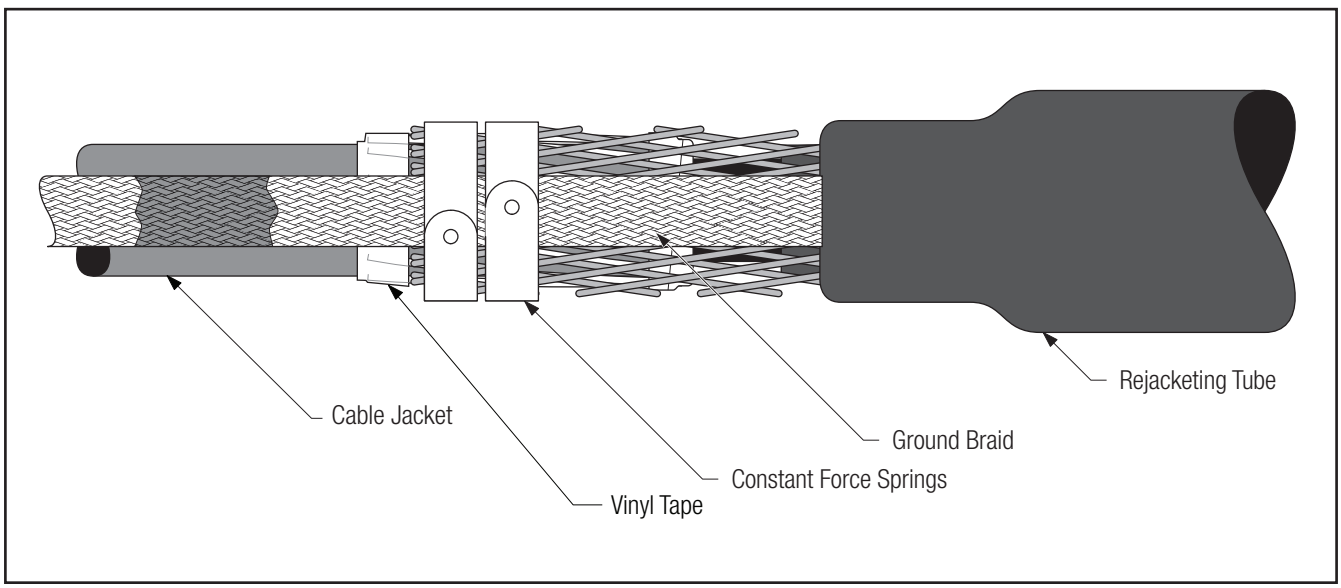


Figure 18

5.8 Place one mastic sealing strip on the cable jacket under the solder block of the ground strap no farther than 1/2" (13 mm) from the edge of the cut neutrals *(Figure 19)*.

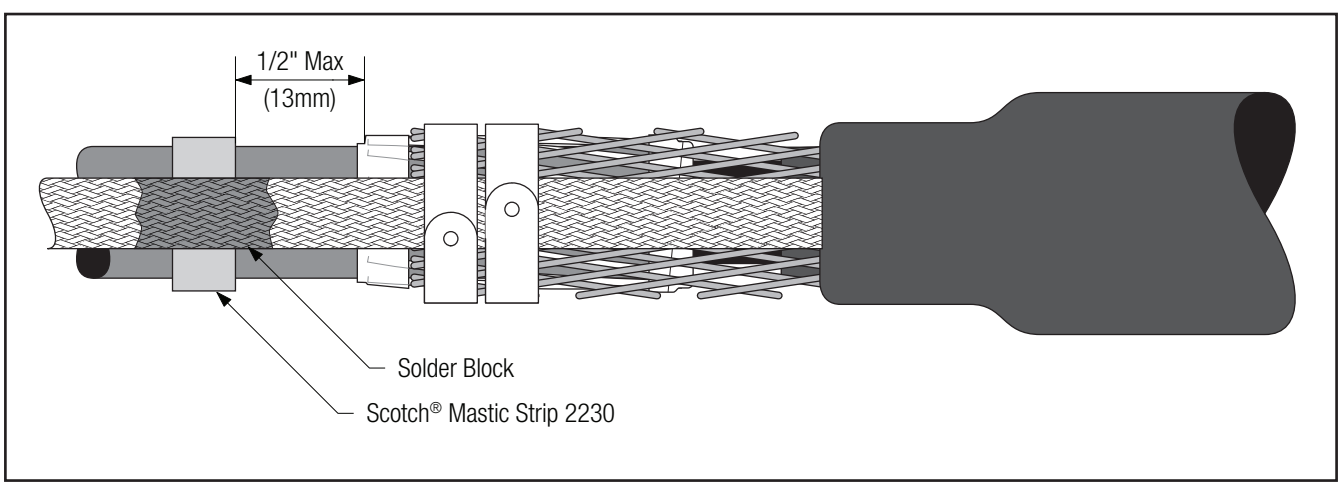


Figure 19

5.9 Place another mastic strip over the solder block. Press the mastic strips around the solder block and to the cable jacket *(Figure 20)*.

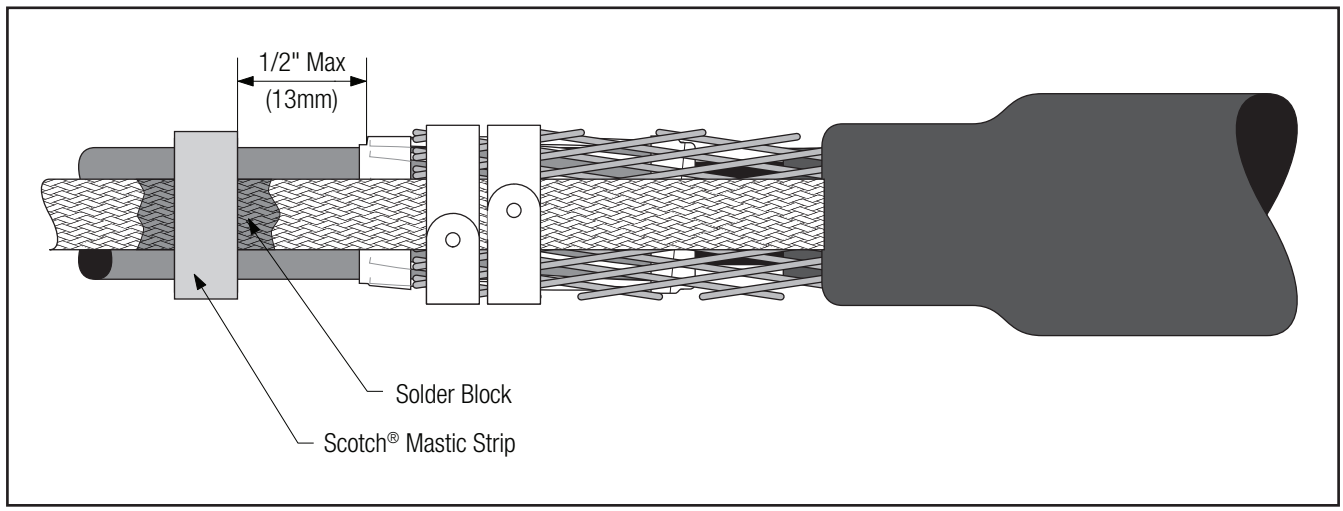


Figure 20

5.10 Wrap two half-lapped layers of vinyl tape over all constant force springs *(Figure 21)*.

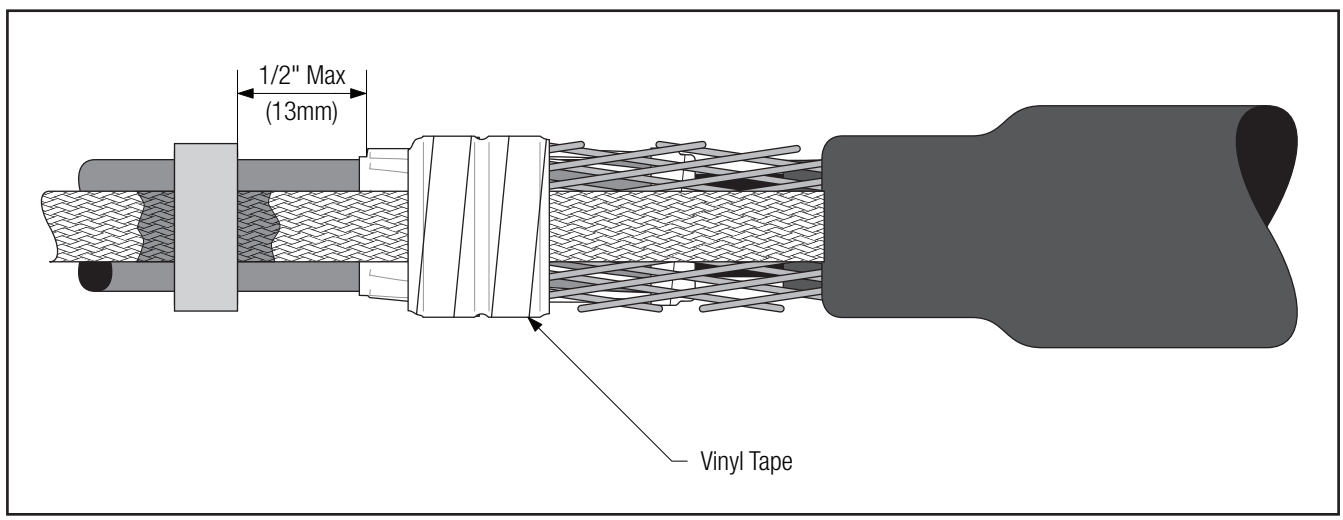


Figure 21

Go to Section 7.0 "Install Jacket."

6.0 External Grounding with Ground Wire (Optional)

6.1 Connect a ground wire to the pre-installed ground braid on the integrated splice using an appropriate connector. Keep connector profile as low as possible. For C-tap or H-tap connectors, position flat against the cable. Crimp connector following the connector manufacturer's recommendations *(Figure 22)*.

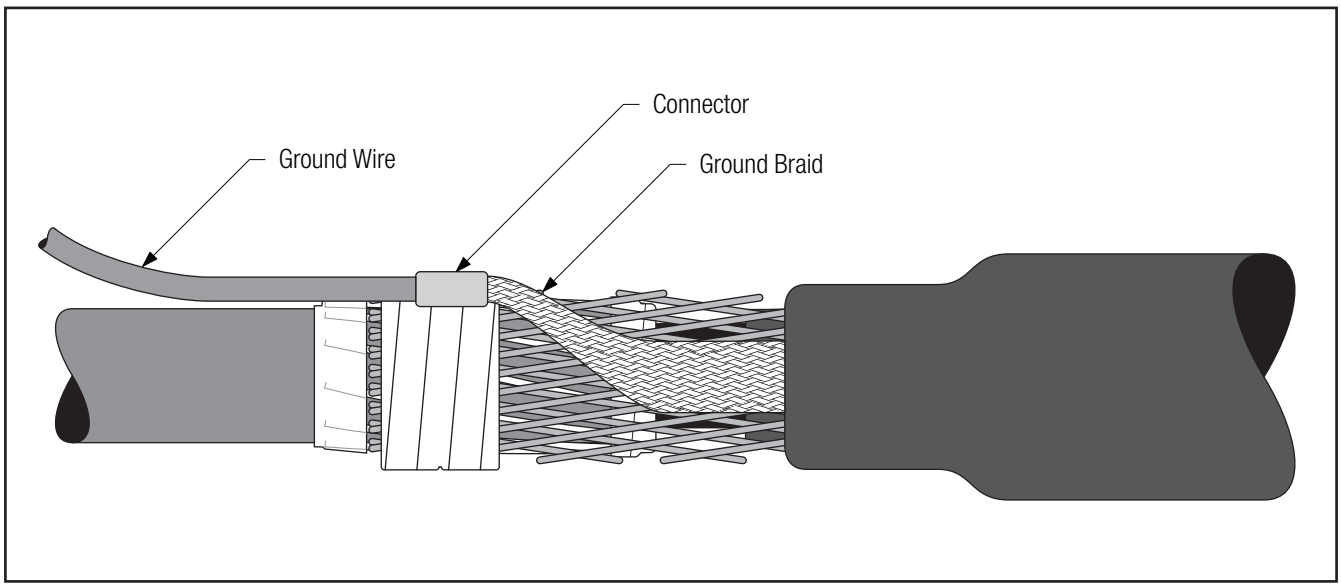


Figure 22

6.2 Cut one mastic sealing strip into two equal pieces. Place one piece on the cable jacket centered under the ground wire near the jacket end. Roll two mastic strips into small rolls. Place one roll on either side of the ground wire. *(Figure 23)*.

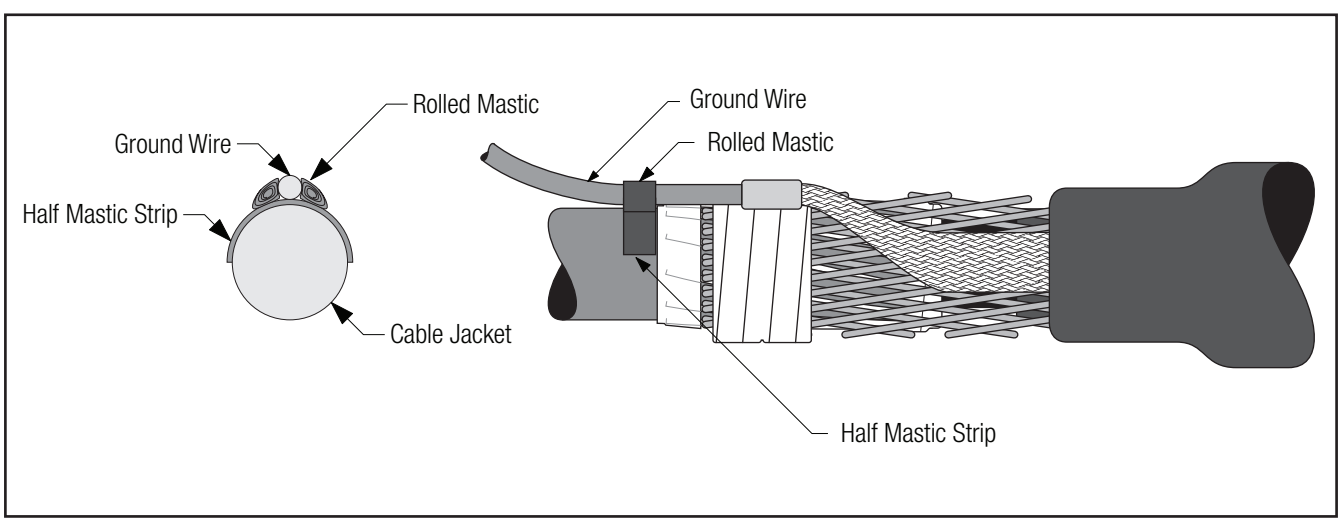


Figure 23

6.3 Place the other half mastic strip over the previously applied mastic and ground wire. Press the mastic around the ground wire and to the cable jacket *(Figure 24)*.

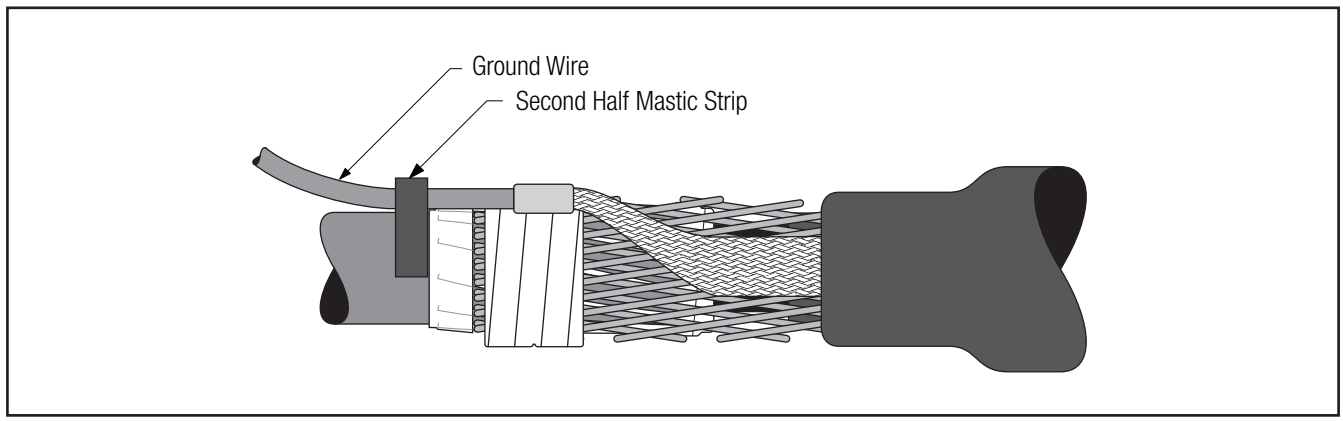


Figure 24

6.4 Wrap two half-lapped layers of vinyl tape over the ground connector *(Figure 25)*.

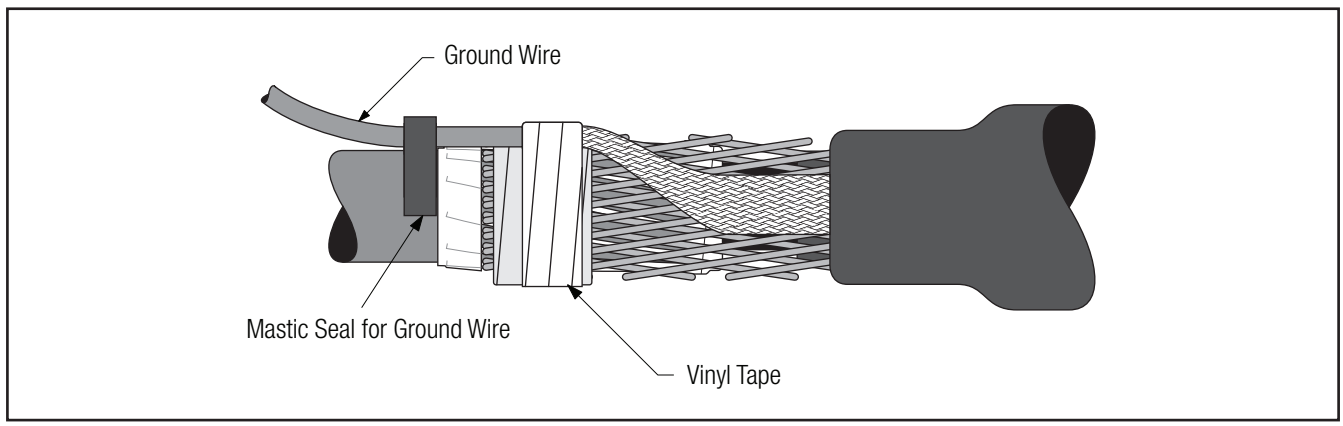


Figure 25

7.0 Install Jacket

Note: Jacketing is not optional.

7.1 Wrap a roll of slightly stretched Scotch® Rubber Mastic Tape 2228, 2" x 36" around cable jacket at edge of cut neutrals (tacky side toward cable) *(Figure 26)*. Stretch and tear off last 1–2" (25–50 mm) of mastic *(Figure 27)*. If grounding was applied, apply tape over mastic strips.

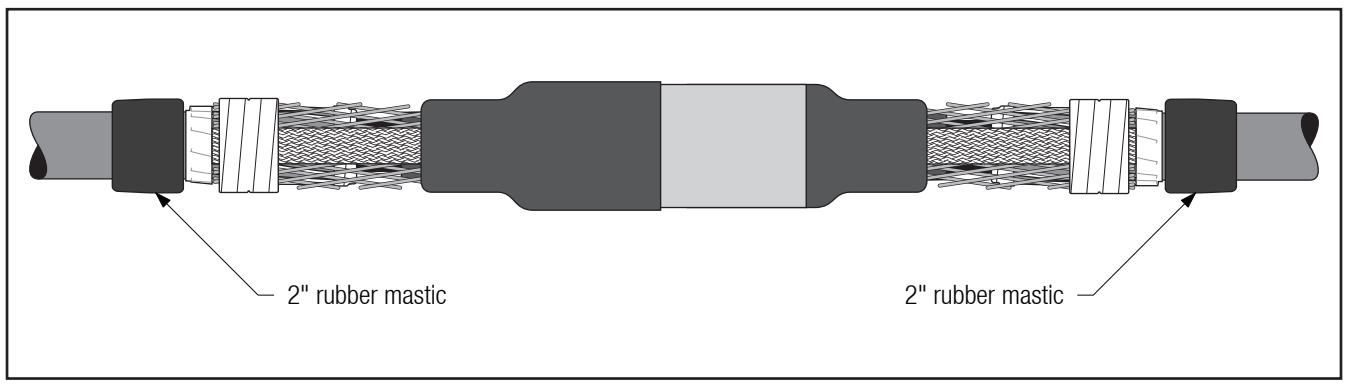


Figure 26

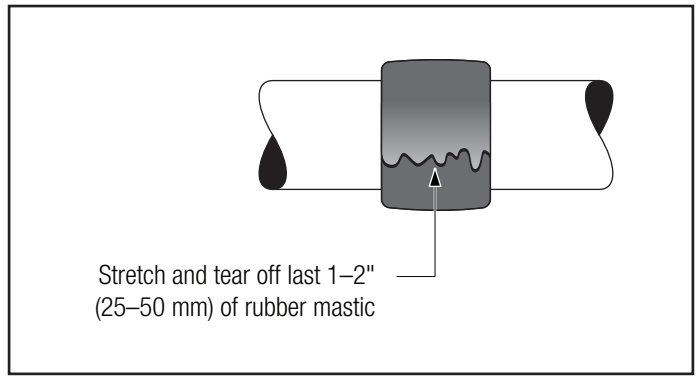


Figure 27

7.2 Install the rejacketing tube by twisting the tube (not the liner) from side to side to start the movement. Then slide and unroll the tube over the constant force springs and rubber mastic. *(Figure 28)*. Repeat on other side.

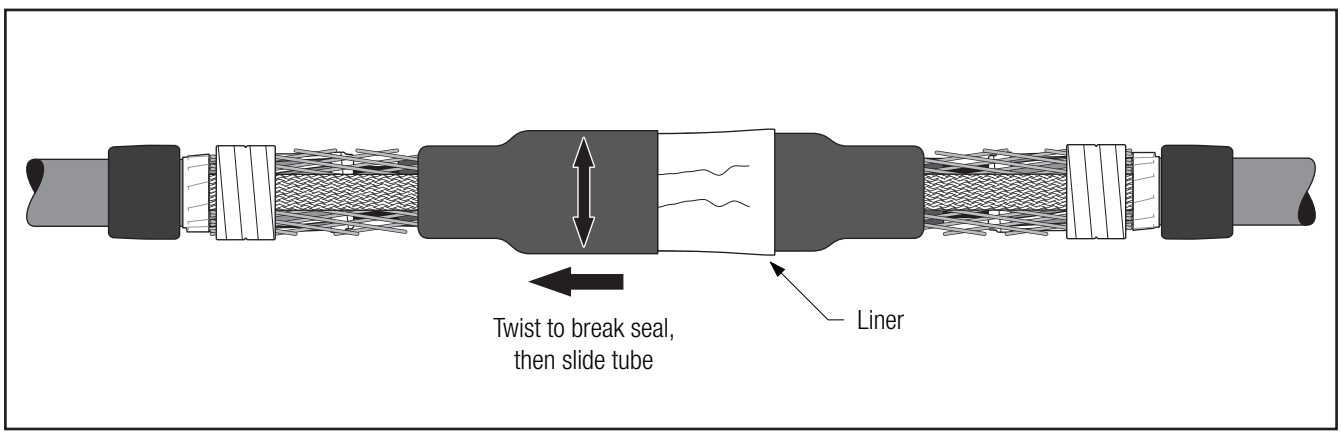


Figure 28

7.3 Remove the liners and discard.

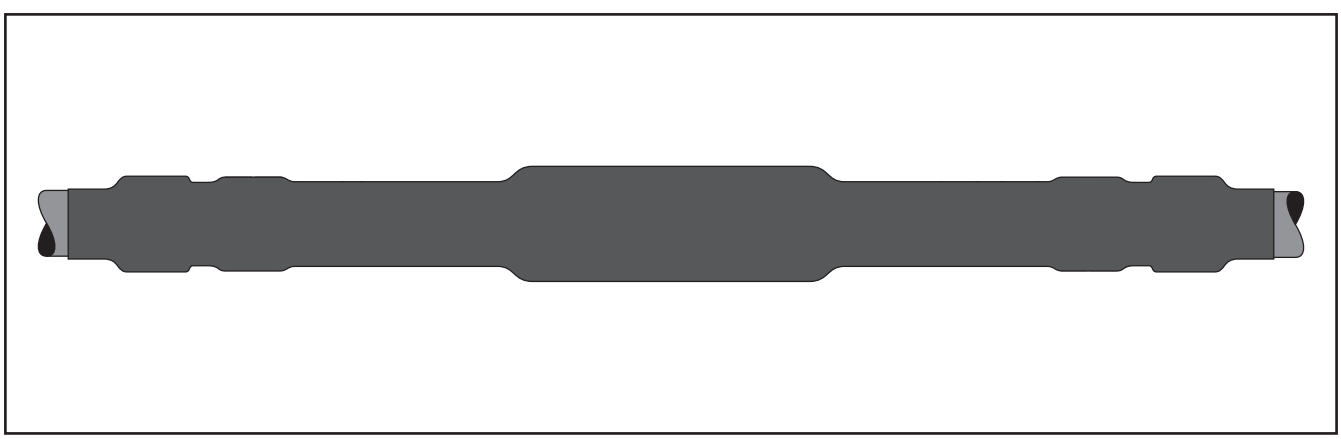


Figure 29

7.4 Connect optional grounding.

Note: ***In applications where the splice is regularly exposed to high levels of ultra-violet radiation (i.e. direct sunlight), wrap two half-lapped layers of Scotch® Super 33+™ Vinyl Electrical Tape or Scotch® Vinyl Electrical Tape Super 88 over the re-jacketing tube.***

Crimping Tool - Die Sets (number of crimps/end)

3M™ Connector Number	Conductor Size (kcmil)	Burndy			Thomas & Betts Corp.			Square D Co. Anderson Div.	
		Y34A	Y35, &39 Y45*, Y46*	Y1000**	TBM 8	TBM 12	TBM 15	VC6-3** VC6-FT**	VC8C**
10014 (Cu)	500	A34R (2)	U34RT (2)	—	Brown (3)	—	87H (3)	(2)	—
20014 (Al/Cu)	500	—	U34ART (4)	(1)	—	106H (3)	106H (4)	(2)	(2)
11014 (Cu)	500	A34R (2)	U34RT (3)	—	Brown (4)	—	87H (4)	(3)	—
CI-500 (Al/Cu)	500	—	U34ART (3)	—	—	—	106H (3)	(3)	—
20016 (Al/Cu)	600	—	U36ART (4)	(1)	—	—	115H (3)	(3)	(3)
10019 (Cu)	750	—	U39RT (3)	—	—	—	106H (3)	—	—
20019 (Al/Cu)	750	—	U39ART (4)	—	—	—	125H (5)	(3)	(3)
11019 (Cu)	750	—	U39RT (5)	—	—	—	106H (4)	—	—
CI-750 (Al/Cu)	750	—	S39ART (3)	—	—	—	140H (3)	(3)	—
10024 (Cu)	1000	—	S44RT, P44RT (4)	—	—	—	125H (3)	—	—
20024 (Al/Cu)	1000	—	S44ART, P44ART (4)	—	—	—	140H (4)	—	—
11024 (Cu)	1000	—	S44RT, P44RT (4)	—	—	—	125H (4)	—	—

*Y45 and Y46 accept all Y35 dies (“U Series”). For Y45, use PT6515 adapter. For Y46, use PUADP adapter.

**Anderson VC6-3, VC6-FT, VC8C and Burndy Y1000 require no die set.

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