



Cold Shrink™

QS2013T Splice Kit

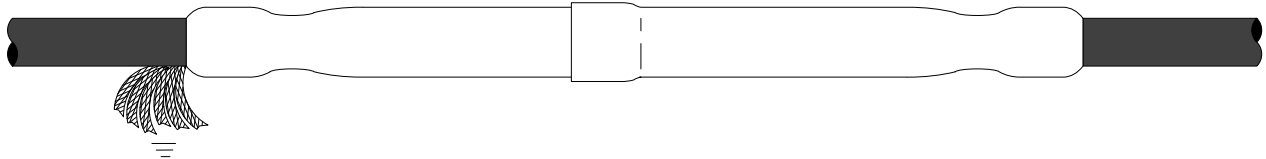
15kV

PILC to PILC

Instruction Sheet

IEEE Std. No. 404

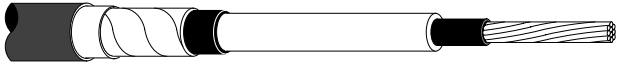
15 kV Class
110 kV BIL



Application Chart

PILC Cable	Insulation O.D. Range	Conductor Size (kcmil)
	0.98 – 1.56 in. (25 – 40 mm)	400 – 1000 (200 – 500 mm ²)
Connector	O.D. Range *	Length Range *
	1.10 – 1.66 in. (28 – 42 mm)	5.25 – 6.50 in. (133 – 165 mm)

* NOTE: If 2000T connector is not used and connector O.D. and/or length is less than minimum, a metallic shielding braid tape is required in addition to kit contents ie; Scotch™ 24 Electrical Shielding Tape.

 <p>PILC Cable (paper insulated lead covered)</p>	<p>3M Cold Shrink™</p> <p>PILC Splice Kit</p> <p>for splicing PILC Cable to PILC Cable</p> <p>QS 2013T</p>				
	<p>78-8096-4531-6</p>				
<table border="1"> <tr> <td>NUMBER OF PAGES: 16</td> <td>SCALE: Not to scale</td> </tr> <tr> <td>ISSUE DATE: 12/20/94</td> <td>ISSUE: A</td> </tr> </table>	NUMBER OF PAGES: 16	SCALE: Not to scale	ISSUE DATE: 12/20/94	ISSUE: A	
NUMBER OF PAGES: 16	SCALE: Not to scale				
ISSUE DATE: 12/20/94	ISSUE: A				

Kit Contents

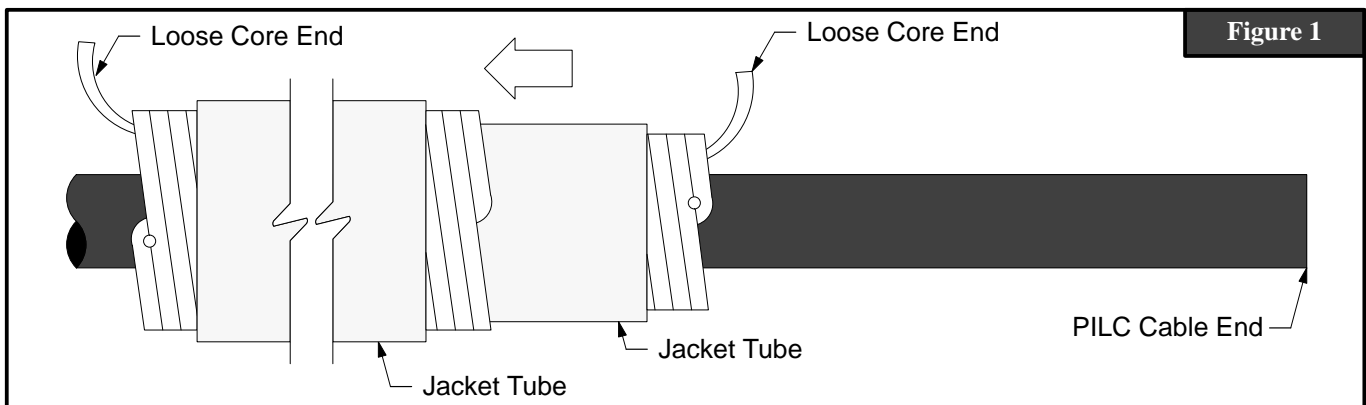
- | | |
|--|---|
| 1 Cold Shrink™ Splice Body | 1 Roll, Scotch™ 13 Semi-Conducting Tape |
| 2 Cold Shrink™ Oil Stop Tubes (thin-wall) | 1 Roll, Scotch™ 23 Tape |
| 2 Cold Shrink™ Jacket Tubes | 2 Rolls, Scotch™ Rubber Mastic (unmarked) |
| 1 Shielding Sleeve (3 ft.) | 2 Tubes, 3M P55/R Compound (red) |
| 5 Constant Force Springs (shield connectors) | 12 Strips, Sealing Mastic |
| 3 Ground Braids | 2 Cable Preparation Templates |
| 2 Rolls White Restricting Tape | 2 Instruction Booklets |
| 1 Strip, Scotch™ 13 Semi-Conducting Tape | |

*** NOTE: Vinyl Tape is required, NOT INCLUDED in kit.**

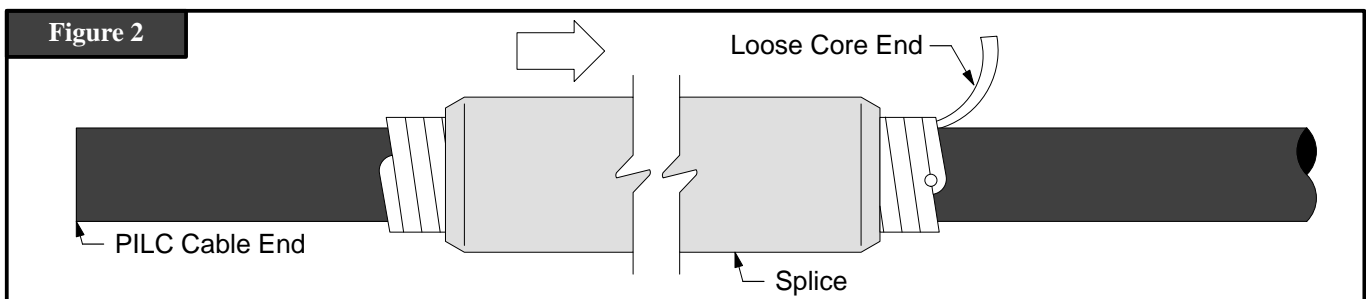
A. Position Components on Cable

1. Slide 2 Cold Shrink™ Jacket Tubes onto PILC cable (largest Cold Shrink™ assemblies) with loose core ends facing opposite directions as shown in (Figure 1).

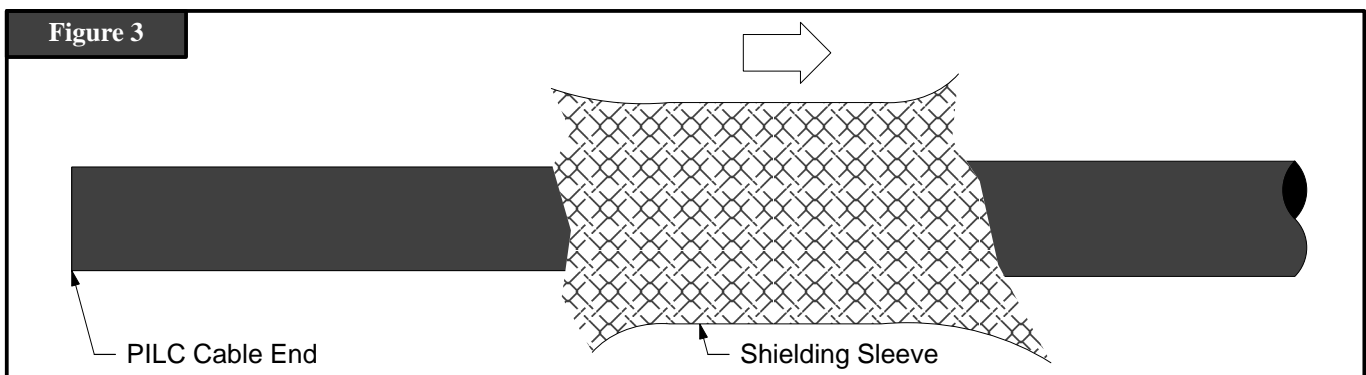
NOTE: Cold Shrink™ components may be telescoped to save space (Figure 1).



2. Slide Cold Shrink™ heavy wall splice body onto other PILC cable, with loose core end leading, facing away from cable end (Figure 2).



3. Expand diameter of Shielding Sleeve by pushing in at ends (to shorten) and slide onto one PILC cable (Figure 3).

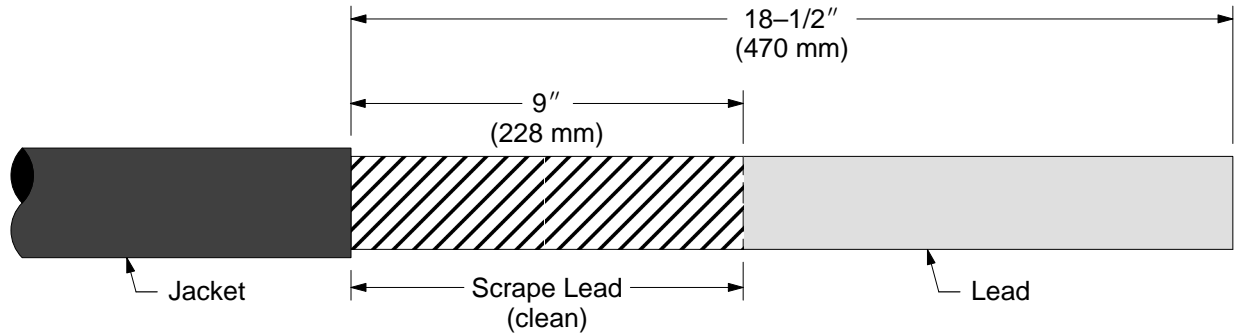


B. Prepare PILC Cable

1. Prepare cables according to figures 4 and 5.

NOTE: For non-jacketed cable, place a tape marker on lead sheath to mark where a jacket would end (as reference for measuring).

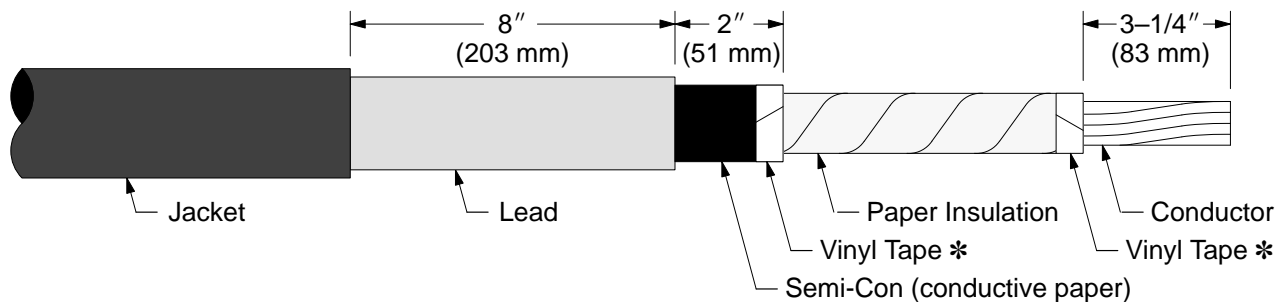
Figure 4



2. To accommodate long connectors, the insulation cutback dimension of 3-1/4" (83 mm) may be increased to 4-1/4" (108 mm) maximum. To obtain oil stop, the cutback dimension should include 1/2" (13 mm) exposed conductor between connector end and insulation end (with connector installed). **DO NOT change any other dimensions.**

* **NOTE:** Vinyl tape need not be removed. **DO NOT EXCEED 2 WRAPS OF TAPE PER BAND.**

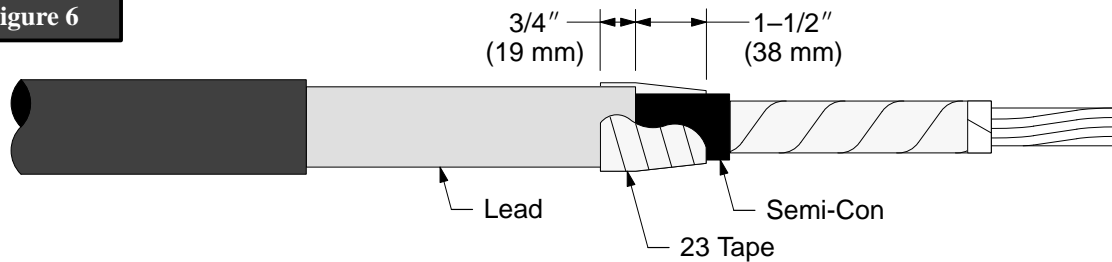
Figure 5



C. Install Oil Stop

1. On both cables fill the step at the edge of the lead with 23 tape. Build a smooth taper for a distance of 1-1/2" (38 mm) from lead to semi-con, over-lapping 3/4" (19 mm) onto lead with 2 highly stretched layers (*Figure 6*).

Figure 6



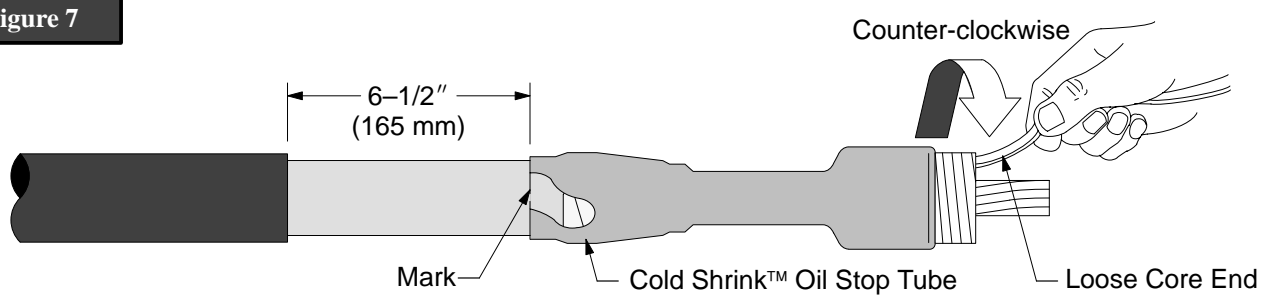
2. Mark lead 6-1/2" (165 mm) from jacket end. Position Cold Shrink™ Oil Stop Tube (THIN WALL, SMALL DIAMETER) over prepared cable, aligning end of tube (not core) with mark (*Figure 7*).

NOTE: Loose core end should face cable end.

3. Install Oil Stop Tube by unwinding loose core end counter-clockwise, carefully maintaining alignment with mark (*Figure 7*).

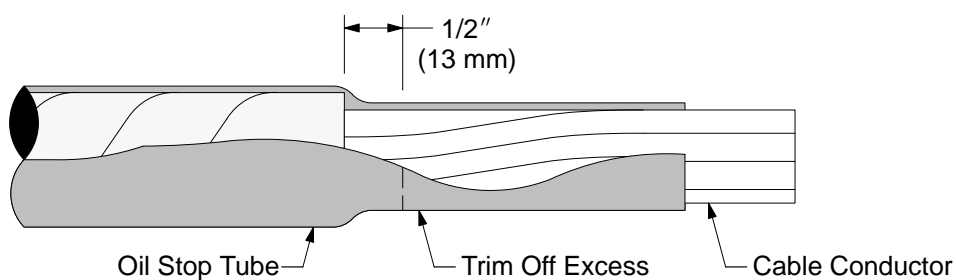
NOTE: An occasional tug of the core strand while unwinding will aid core removal.

Figure 7



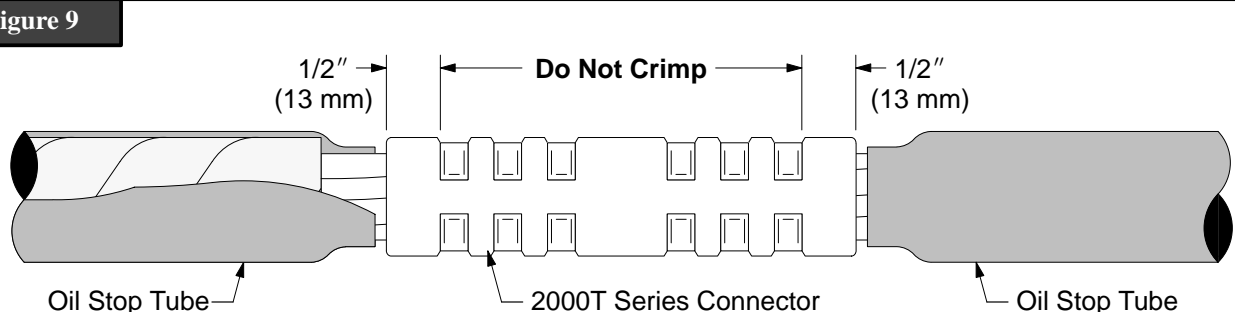
4. Trim off excess Oil Stop Tube, over lapping conductor more than 1/2" (13 mm) (*Figure 8*).

Figure 8



5. Join cables with appropriate size connector. If 2000T Series connector is used, **DO NOT crimp closer than 1/2" (13 mm) from connector ends** (*Figure 9*). Crimping information specific to 2000T Series connectors can be found on (*pages 13 and 14*).

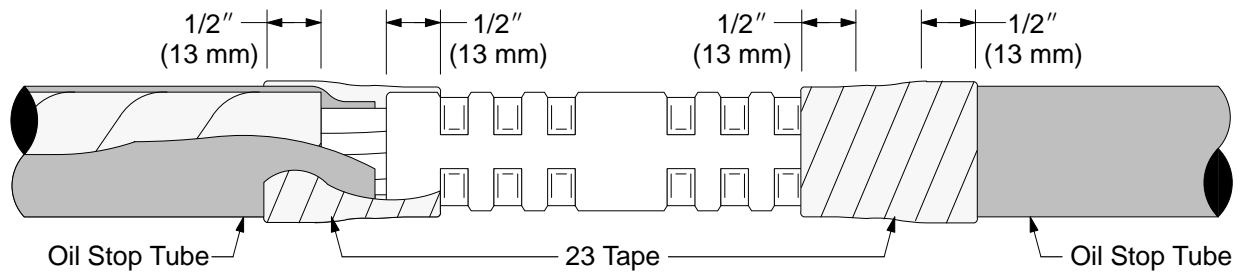
Figure 9



C. Install Oil Stop (continued)

6. Fill-in depression formed between end of oil/paper cable insulation and connector with highly stretched 23 Tape. Apply so final 2 half-lapped layers extend $1/2''$ (13 mm) onto cable insulation and connector (*Figure 10*). If connector O.D. is smaller than cable insulation O.D. apply multiple wraps of 23 Tape at connector end to the approximate diameter of cable insulation.

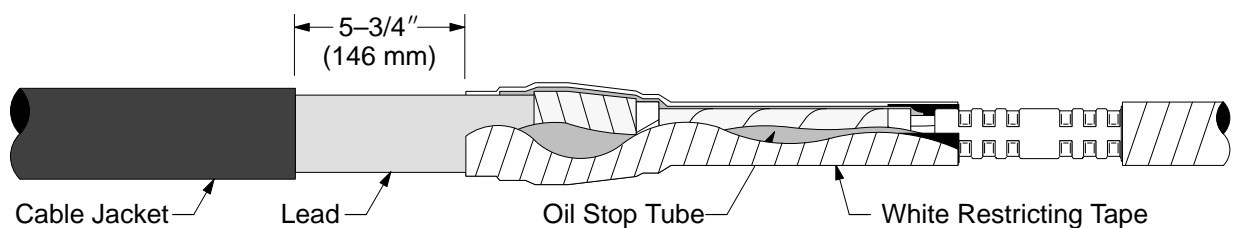
Figure 10



7. Apply 4 half-lapped layers of White Restricting Tape over the applied 23 Tape and Cold Shrink™ Oil Stop Tubes, installed on oil/paper insulation starting and ending on lead, $5-3/4''$ (146 mm) from end of cable jacket (*Figure 11*).

NOTE: This tape does not stretch, but should be applied with CONSTANT TENSION TO AVOID WRINKLING.

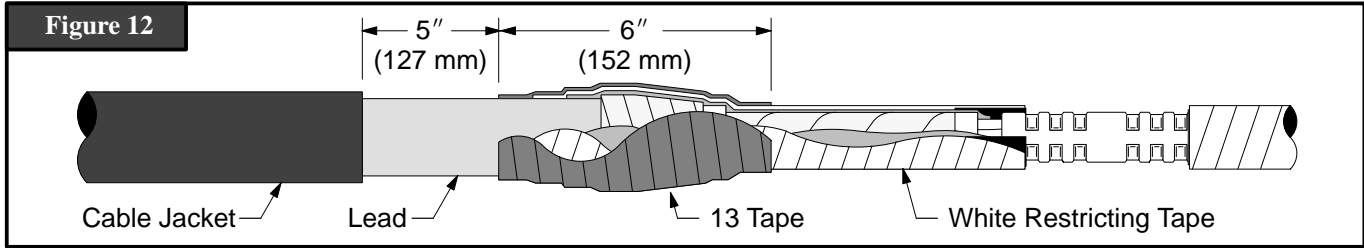
Figure 11



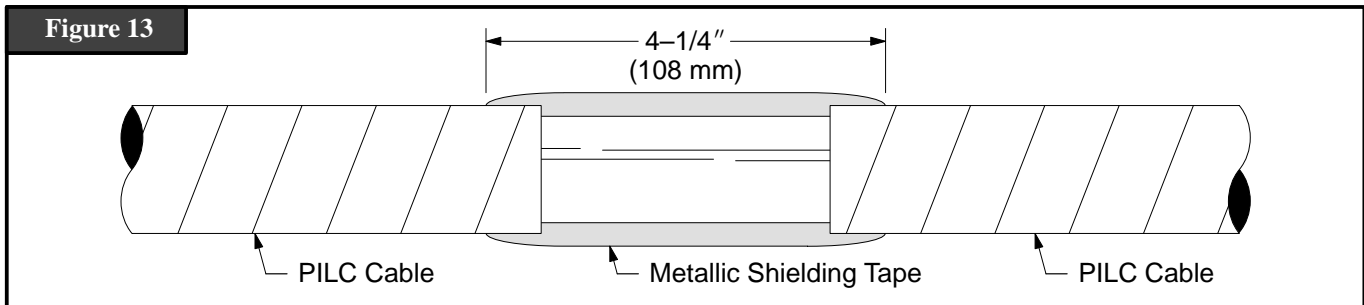
NOTE: When applying White Restricting Tape over uneven surfaces, thumb may be used to smooth it as it is applied. Apply the tape as smooth as possible.

D. Install Splice

1. Apply 2 half-lapped layers of 13 Semi-Conducting Tape from the lead onto the White Restricting Tape. Start 5" (127 mm) from end of cable jacket and apply for 6" (152 mm) (Figure 12).

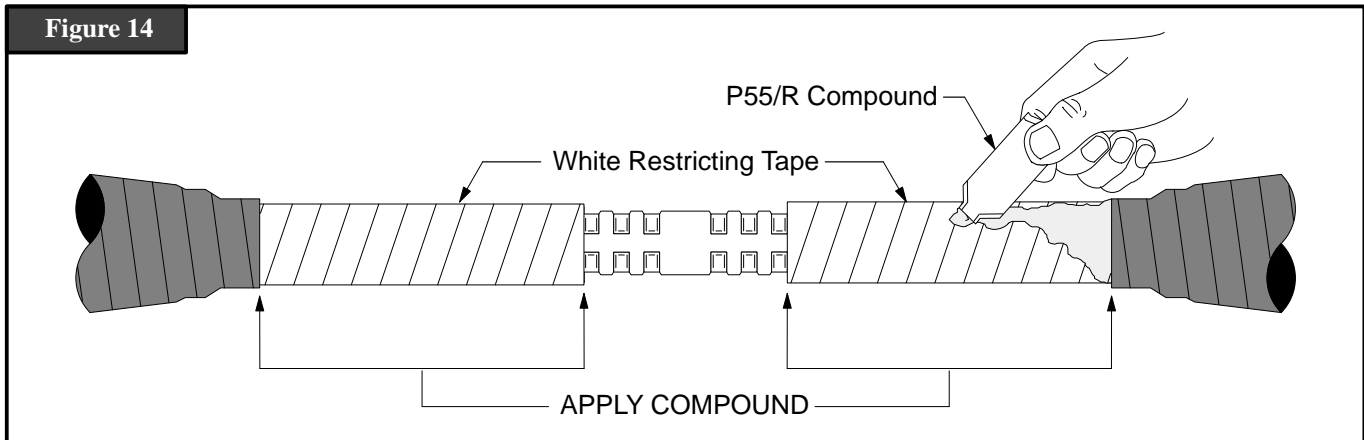


2. If a connector other than a 2000T Series is used, and the O.D. is less than 1.10" (28 mm) and /or length is less than 5.25" (133 mm) increase the connector diameter to 1-1/8" (28 mm) by applying successive half-lapped layers of metallic shielding tape (ie; Scotch™ 24 Electrical Shielding tape) over connector center for a distance of 4-1/4" (108 mm). Secure end of shielding tape with solder (Figure 13).

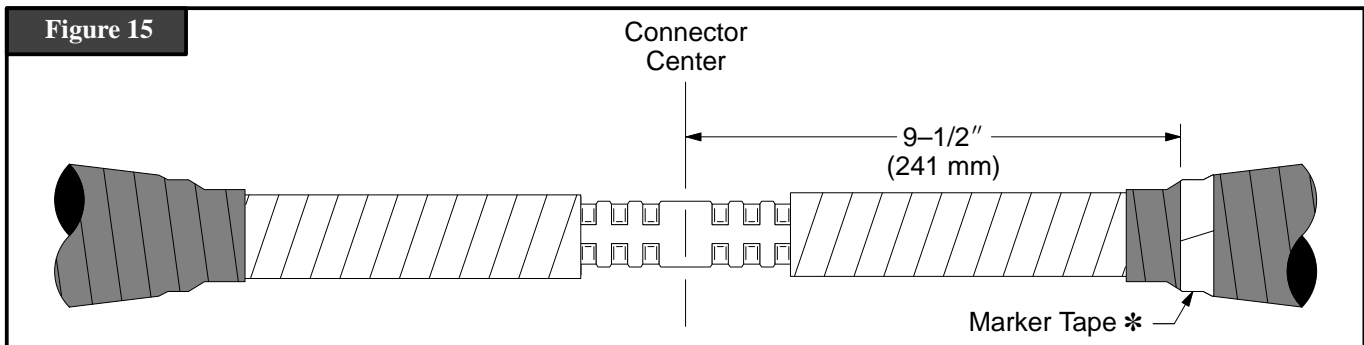


3. Apply a liberal amount of P55/R Compound over the exposed White Restricting Tape, extending onto the edges of semi-conducting tape (Figure 14).

CAUTION: DO NOT USE SILICONE GREASE



4. On cable opposite of where splice body is parked, apply a wrap of vinyl tape to serve as a "marker", 9-1/2" (241 mm) from connector center (Figure 15).

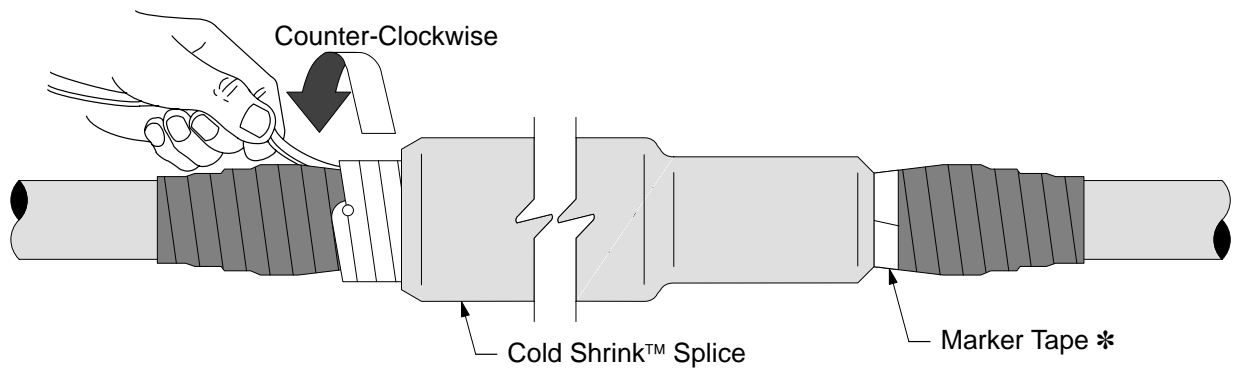


D. Install Splice (continued)

5. Position Cold Shrink™ Splice so leading edge of splice (not core) aligns with tape “marker” previously applied (*Figure 16*).
6. Install splice by removing core, unwinding counter-clockwise (*Figure 16*).

TIP: An occasional tug of the core strand while unwinding will aid core removal.

Figure 16

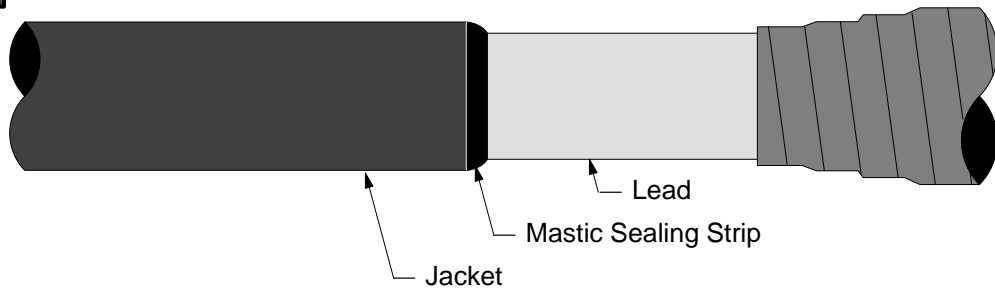


E. Install Ground Braid

1. Apply a Mastic Sealing Strip at edge of PILC cable jackets, forming a seal to the cable lead (*Figure 17*).

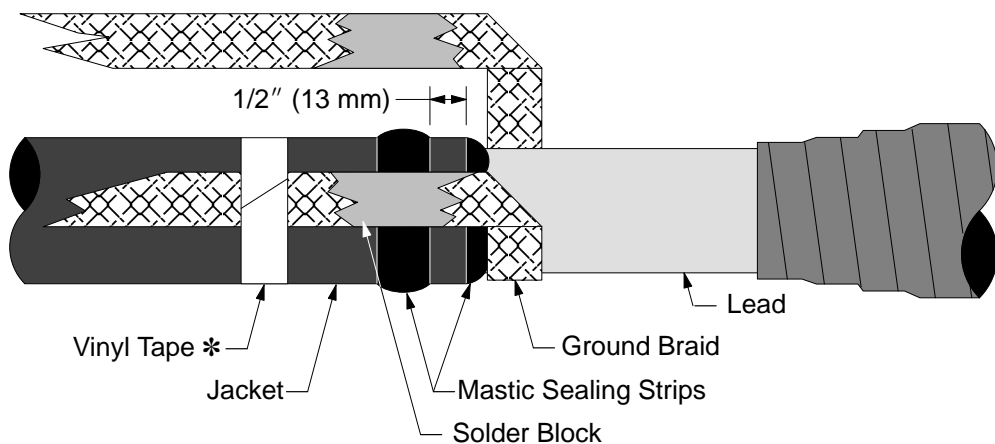
NOTE: This step does not apply to non-jacketed PILC cable.

Figure 17



2. At one end of splice apply a Mastic Sealing Strip around cable jacket, 1/2" (13 mm) from jacket edge (*Figure 18*).
3. Position Ground Braid with one leg along PILC cable jacket, centering solder-block on Mastic Sealing Strip as shown in *Figure 18*. Secure the braid to the cable jacket with vinyl tape (*Figure 18*).

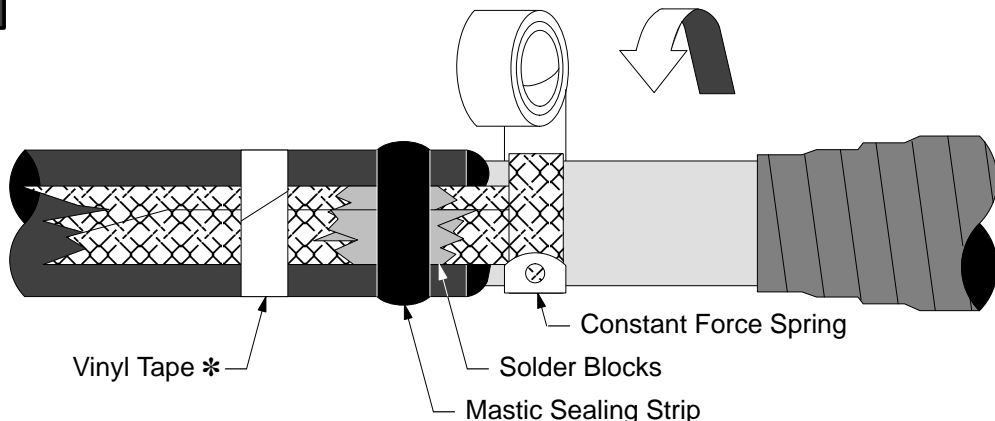
Figure 18



4. Wrap braid around cable lead and secure with Constant Force Spring. Wrap spring in the same direction as the ground strap and cinch (tighten) the final wrap (*Figure 19*).
5. Hold 2ND leg in place with an application of vinyl tape (*Figure 19*).
6. Press solder blocks into mastic. Apply another Mastic Sealing Strip over solder-blocks and previous Mastic Seal (*Figure 19*).

NOTE: If solder-blocks overlap at Mastic Seal, apply a short length of mastic between them.

Figure 19



E. Install Ground Braid (continued)

7. Install 2ND and 3RD Ground Braid next to the first, as described in *Steps 3 and 4* above. Position braids so the legs are side-by-side if possible. Hold braids in place with an additional application of vinyl tape (*Figure 20 and Figure 21*).
8. Press solder-blocks into mastic. Apply another Mastic Sealing Strip over solder-blocks and previous Mastic Seal (*Figure 20 and Figure 21*).

NOTE: If solder-blocks overlap at Mastic Seal, apply a short length of mastic between them.

Figure 20

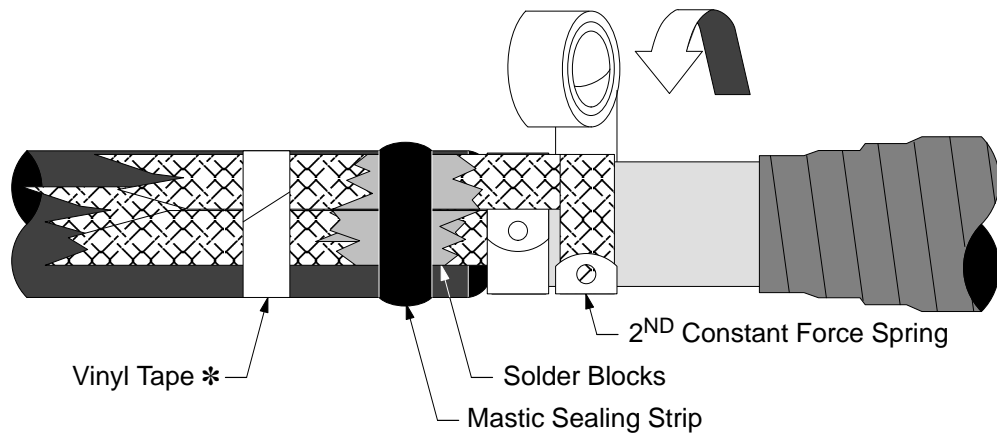
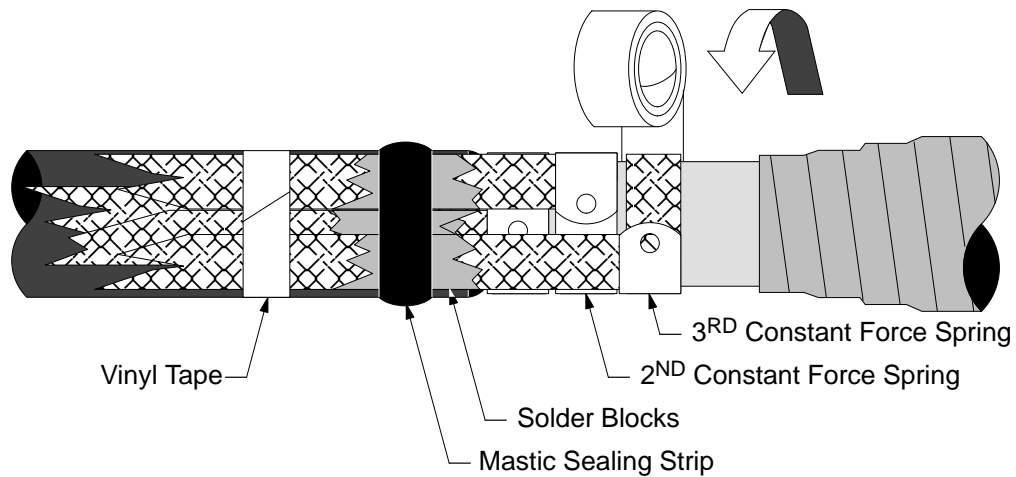


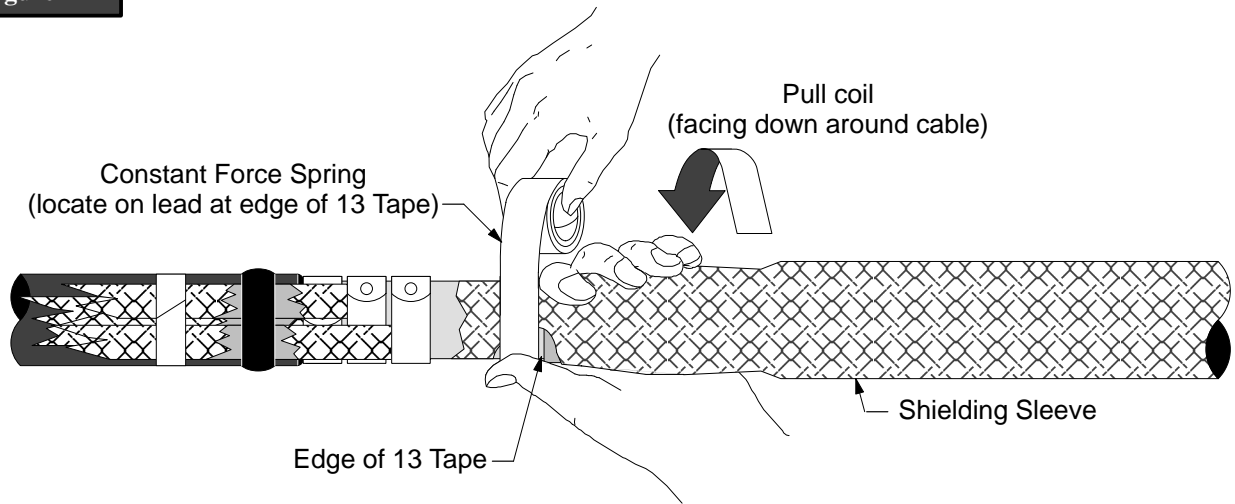
Figure 21



F. Install Shielding Sleeve

1. Center Shielding Sleeve over splice. Use hands to lengthen sleeve, conforming it to surface of splice and cables (*Figure 22*).
2. Secure sleeve to PILC cable's exposed lead. Install a Constant Force Spring for 1 wrap only, around the sleeve and lead, just beyond edge of 13 tape (*Figure 22*).

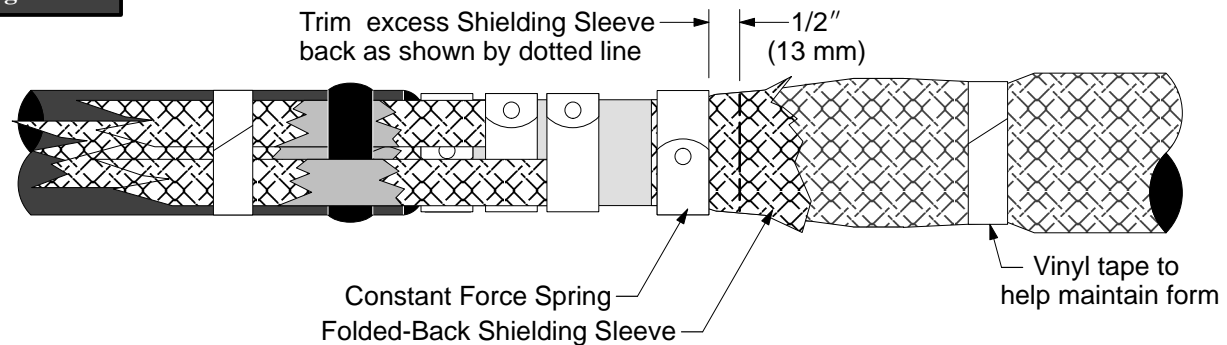
Figure 22



3. Fold end of Shielding Sleeve back over the single wrap of spring, then continue installing spring over the folded-back sleeve. Trim folded-back sleeve at 1/2" (13 mm) from spring (*Figure 23*).

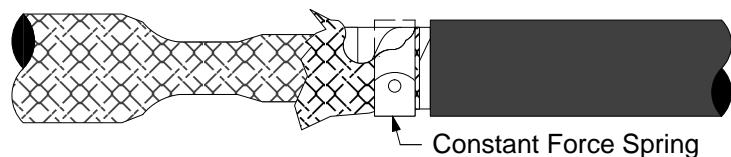
NOTE: Make certain that Shielding Sleeve is snug against splice. Securing with vinyl tape will help maintain form across splice body (*Figure 23*).

Figure 23



4. Secure opposite end of sleeve, using same method described in Steps 2 and 3 (*Figure 24*).

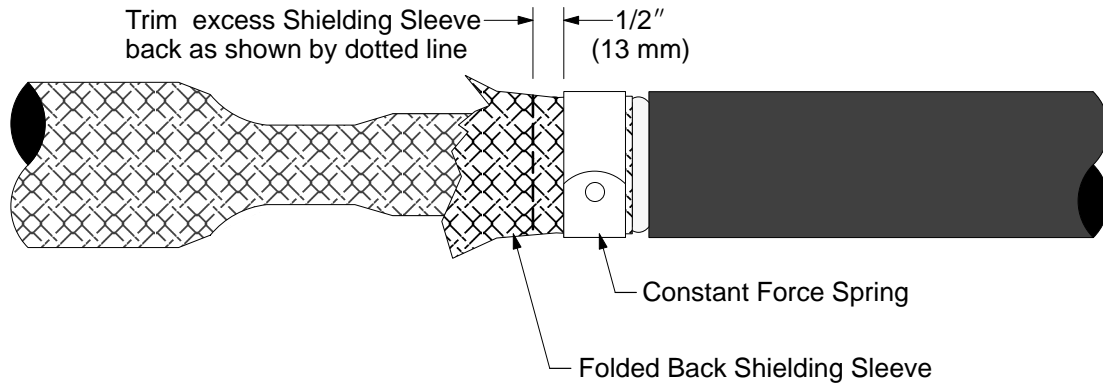
Figure 24



F. Install Shielding Sleeve (continued)

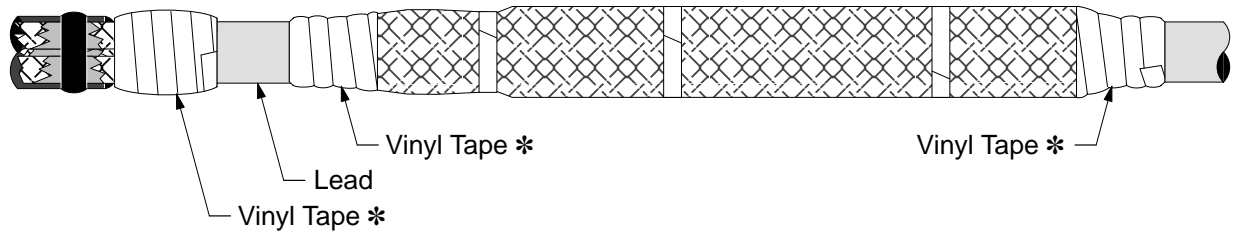
- Trim folded-back Shielding Sleeve at $1/2''$ (13 mm) from spring (*Figure 25*).

Figure 25



- Apply vinyl tape, over all springs and folded-back Shielding Sleeve (*Figure 26*).

Figure 26



G. Install Splice Jacket

1. Apply Rubber Mastic (2" [51 mm] wide unmarked roll), mastic side down, over ends of cable jackets. Build up the thickness to the diameter listed in *Table 1* below and (*Figure 27*).

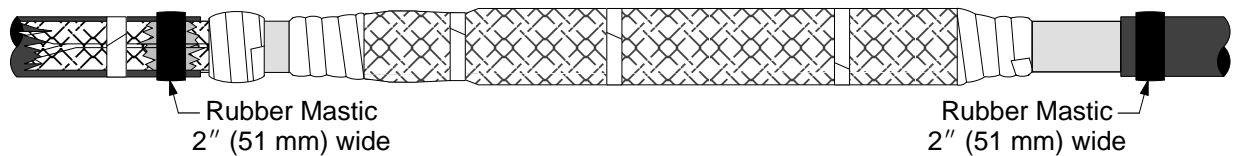
NOTE: For Concentric Neutral Cable (CN) wrap mastic below and over neutral wires to form a seal.

Cable Conductor Size (kcmil)	Rubber Mastic	
	Number of Wraps	Minimum Mastic O.D.
400 – 750 (200 – 300 mm ²)	6*	1-15/16" (49 mm)
800 – 1000 (301 – 500 mm ²)	5*	

Table 1

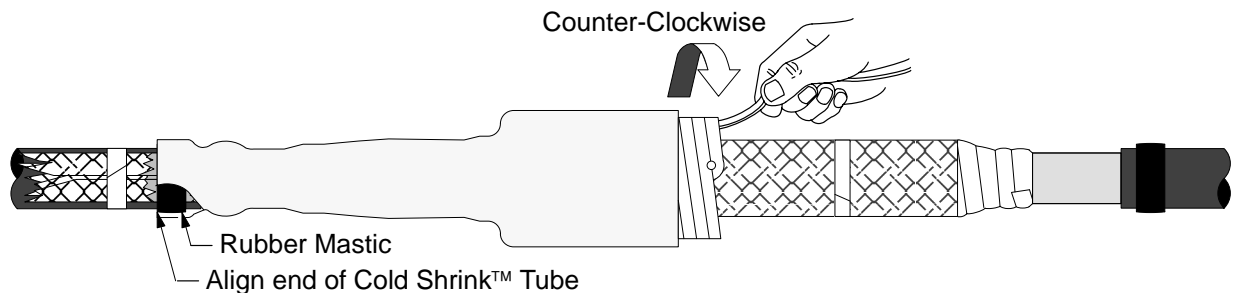
***NOTE: Highly stretch first and last wraps, to aid in forming a tight seal.**

Figure 27



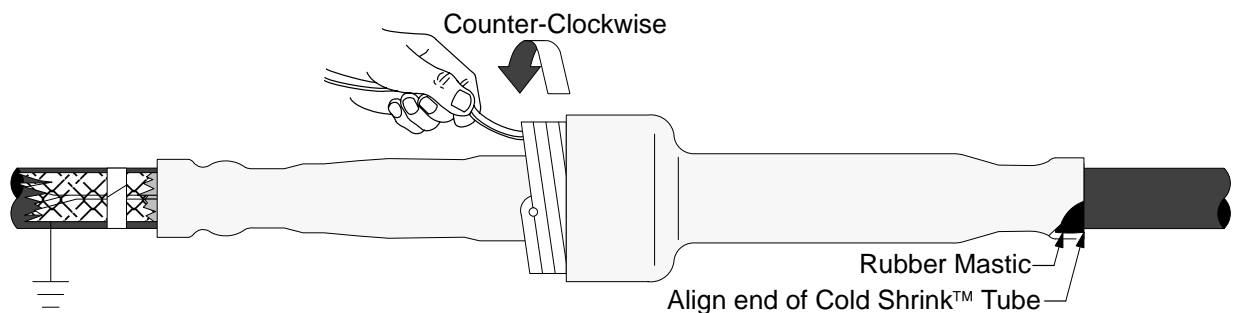
2. Slide smaller diameter Cold Shrink™ Jacket tube into position over splice. Align end of tube (not core) so that previously applied Rubber Mastic is completely covered and install by removing core (*Figure 28*).

Figure 28

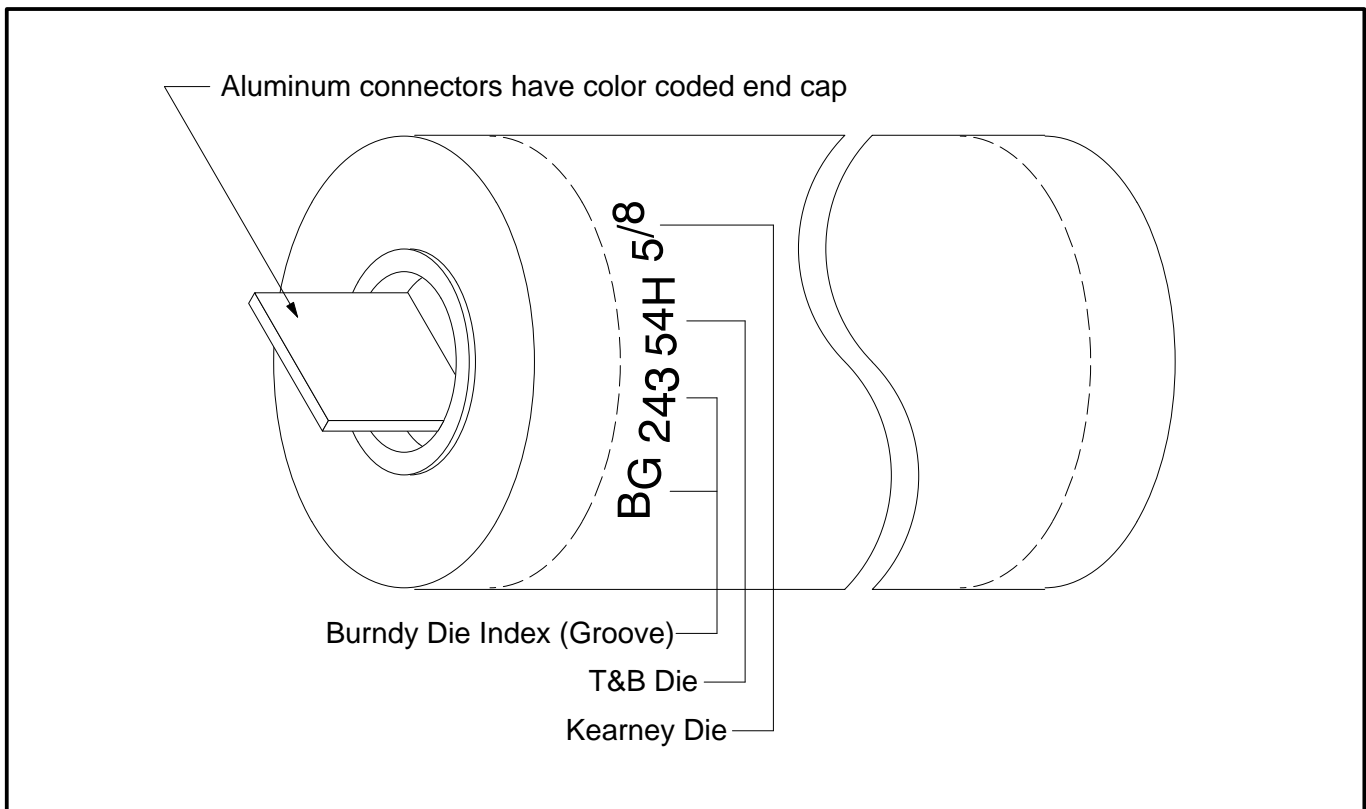


3. Slide larger diameter Cold Shrink™ Jacket Tube into position over opposite end of splice, aligning tube to cover Rubber Mastic and install by removing core (*Figure 29*).
4. If ground braid was attached (*Figures 18 – 21*) connect braid to ground.

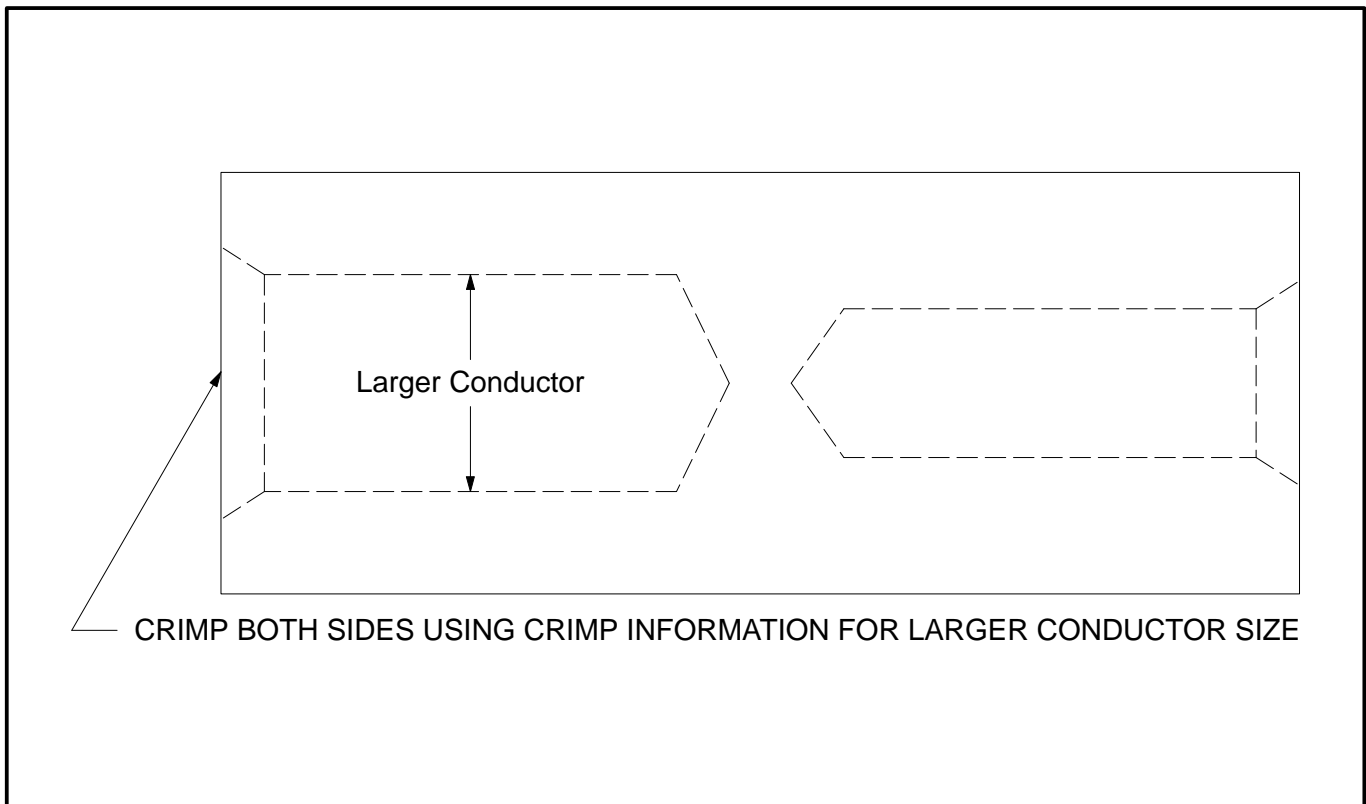
Figure 29



Connector Crimping Information – Scotchlok™ 2000T Series



Conductor Size Transition Aluminum Connectors (Copper/Aluminum)



Aluminum Connectors (Copper/Aluminum)

Conductor Size (kcmil)	CRIMPING TOOL-DIE SETS (NO. OF CRIMPS/END)					
	Burndy	Kearney		Thomas & Betts		Anderson
	Y35, Y39, Y45*, Y46*	WH-1, WH-2 WH-3, PH15	PH25	TBM 12	TBM14M TBM 15	VC6
400	U31ART (2)	1-1/8 to 2 (2)	1-1/8 to 1 (1)	87H (3)**	87H (3)**	Universal (3)
450 500 550	U34ART (3)	1-5/16 (3)	1-5/16 (1)	106H (3)**	106H (3)**	Universal (3)
600 650 750	S39ART (3)	1-1/2 (3)	1-1/2 (1) 1-19/32 (3)	125H (3)**	125H (3)**	—
800 1000	S40ART (3)	1-1/2 (3)	1-1/2 (1) 1-19/32 (3)	140H (3)**	140H (3)**	—

* Y45 and Y46 accept all Y35 dies ("U" series). For Y45 use PT6515 adapter. For Y46 use PUADP adapter.

** Anderson VC6-3 and VC6-FT require no die.

Copper Connectors

Conductor Size (kcmil)	CRIMPING TOOL-DIE SETS (NO. OF CRIMPS/END)					
	Burndy		Thomas & Betts			Anderson
	Y34A	Y35, Y39, Y45*, Y46*	TBM 5 TBM 8	TBM 12	TBM 14M TBM 15	VC6-3, VC6-FT**
500	A34R (2)	U34RT (2)	Brown (3)	87H (3)**	87H (3)**	Universal (2)
750	—	U39RT (3)	—	106H (3)**	106H (3)**	FT only (3)
1000	—	S44RT (4) P44RT (4)	—	125H (3)**	125H (3)**	—

* Y45 and Y46 accept all Y35 dies ("U" series). For Y45 use PT6515 adapter. For Y46 use PUADP adapter.

** Anderson VC6-3 and VC6-FT require no die.

NOTES:

Important Notice to Purchaser:

All statements, technical information and recommendations related to the Seller's products are based on information believed to be reliable, but the accuracy or completeness thereof is not guaranteed. Before utilizing the product, the user should determine the suitability of the product for its intended use. The user assumes all risks and liability whatsoever in connection with such use.

Any statements or recommendations of the Seller which are not contained in the Seller's current publications shall have no force or effect unless contained in an agreement signed by an authorized officer of the Seller. The statements contained herein are made in

lieu of all warranties expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose which warranties are hereby expressly disclaimed.

SELLER SHALL NOT BE LIABLE TO THE USER OR ANY OTHER PERSON UNDER ANY LEGAL THEORY, INCLUDING BUT NOT LIMITED TO NEGLIGENCE OR STRICT LIABILITY, FOR ANY INJURY OR FOR ANY DIRECT OR CONSEQUENTIAL DAMAGES SUSTAINED OR INCURRED BY REASON OF THE USE OF ANY OF THE SELLER'S PRODUCTS THAT WERE DEFECTIVE.



Electrical Products Division

6801 River Place Blvd.
Austin, TX 78726-9000



*Printed on 50% recycled
waste paper, including 10%
post-consumer waste paper.*

Litho in USA.

© 3M 1995 78-8096-4531-6 (A)