PILC Termination

Silicone Rubber Termination (With High-K Stress Relief)

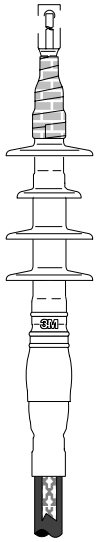
Instruction Sheet

IEEE Std. No. 48–1990

Class 1 Termination
15 kV Class
110 kV BIL

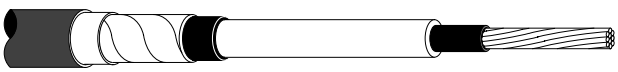
Kit Contents

1 Hi–K Silicone Rubber Skirted Termination
1 Silicone Rubber Cold Shrink™ Tube (gray)
1 EPDM Rubber Thinwall Cold Shrink™ Tube (black)
1 Roll Scotch™ 23 Rubber Tape
1 Roll Scotch™ 13 Semi-conducting Tape
1 Roll White Restricting Tape
2 Strips Scotch™ 70 Silicone Rubber Tape (gray with clear release liners)
2 Strips Sealing Mastic (black with white release liners, bagged)
1 Constant Force Spring
1 Ground Braid
1 Pack of Silicone Grease (clear 5cc tube with green letters)
1 Lug (if specified)
1 Instruction Sheet



Kit Selection Table

Kit Number	Primary Insul. O.D. Range (Over Paper)	Conductor Size Range (AWG & kcmil)	
		15 kV	25 kV
5801–Pb	0.59 – 0.90 (15 – 23 mm)	#4 – 2/0	—
5802–Pb	0.71 – 1.01 (18 – 26 mm)	2/0 – 250	#2 – 1/0
5803–Pb	0.94 – 1.36 (24 – 35 mm)	350 – 600	2/0 – 250
5804–Pb	1.20 – 1.90 (30 – 48 mm)	750 – 1250	350 – 1000



Single–Conductor PILC Cable

3M Quick Term II

Silicone Rubber Terminations Kits for Single Conductor PILC Cable

5801–Pb 5802–Pb
5803–Pb 5804–Pb

Number Of Pages:	8	Scale:	Not to scale
Issue Date:	5/26/95	Issue:	C

78–8096–4234–7

A. Prepare Cable

1. Prepare cable using dimensions shown in *(Figure 1 and Cable Prep Table)*. **Be sure to allow for depth of terminal lug barrel.**

   NOTE: For non jacketed cable place a marker tape where jacket would end and use for measurements. Provide additional exposed conductor distance to account for growth during crimping of ALUMINUM lugs or connectors as in aluminum lug growth table.

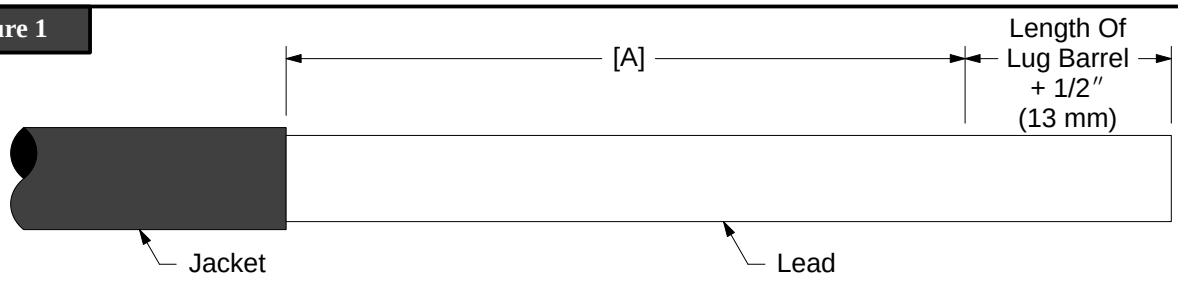
Aluminum Lug Growth Table

Conductor Size (AWG or kcmil)	2/0 – 350	400 – 650	750 – 1000	1250 – 2000
Additional Bare Conductor Required	1/4″	1/2″	3/4″	Field Determine

Cable Prep Table

Kit Number	Dimension [A]
5801–Pb and 5802–Pb	14–1/2″ (370 mm)
5803–Pb and 5804–Pb	15–1/2″ (395 mm)

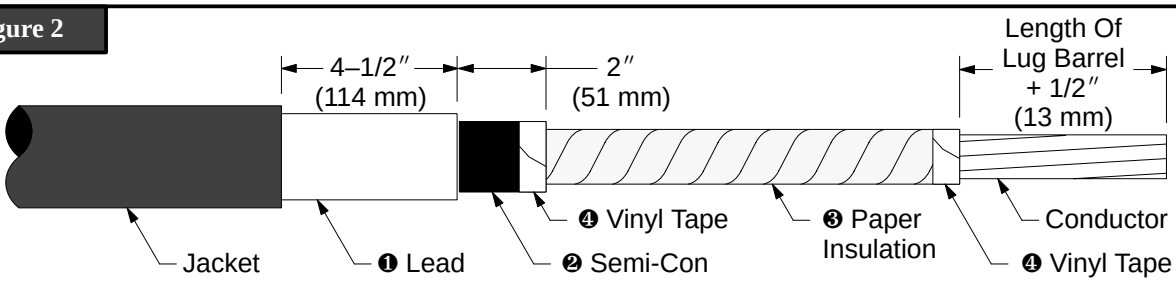
Figure 1



2. Remove lead ❶, semi-con ❷ and paper insulation ❸ as shown in *(Figure 2)*.

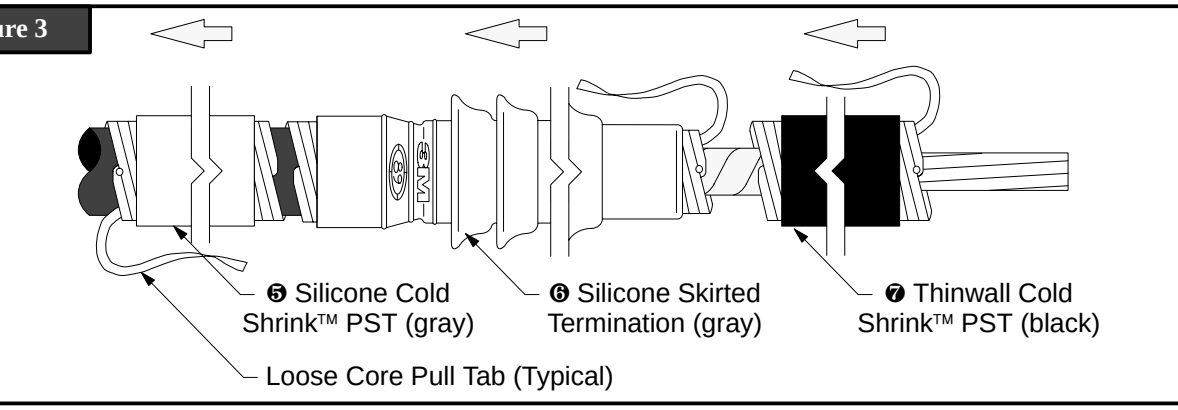
   NOTE: Vinyl tape bands used for dimension marking ❹ *(Figure 2)* need not be removed. DO NOT EXCEED 2 TAPE LAYERS PER BAND.

Figure 2



3. 3M oil stop lugs provide clearance to Cold Shrink™ assemblies ❺, ❻, ❼ *(Figure 3)*. If alternate lugs will not allow this clearance, position the referenced assemblies over the cable end prior to lug installation. Do this in the order shown; with loose core pull tabs directed as indicated *(Figure 3)*.

Figure 3

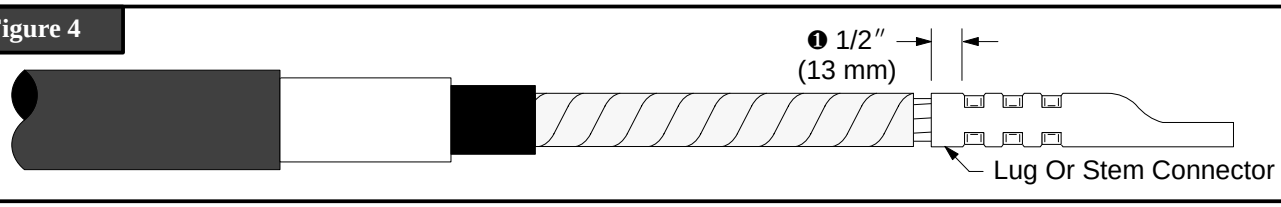


B. Install Lug

1. Crimp on lug or stem connector, leaving a minimum of 1/2″ (13 mm) ❶ uncrimped *(Figure 4)*. This will be part of the oil stop seal.

   NOTE: Lug and stem connector crimp tool information is located on *Page 7 and 8*. 3M Stem connectors are available in sizes 4 thru 4/0 AWG. In <u>all</u> cases follow manufacturers recommended crimping information.

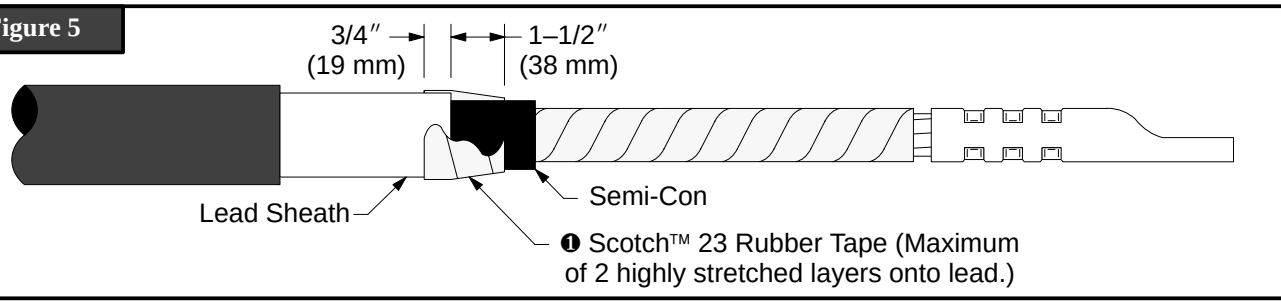
Figure 4



C. Install Oil Stop

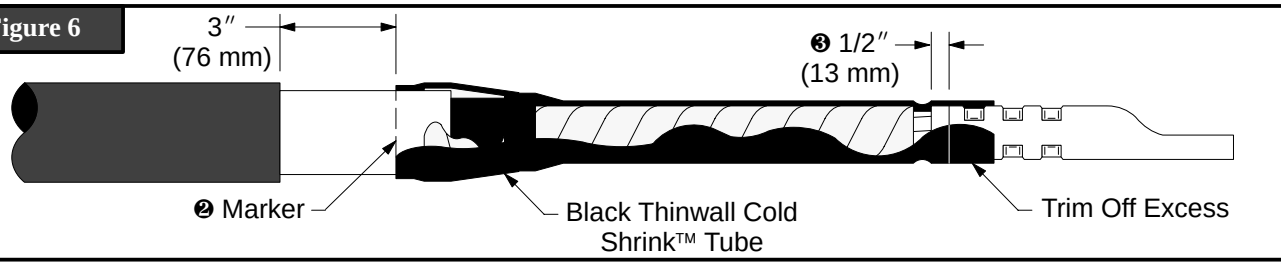
1. Clean the exposed lead surface using an approved solvent as needed.
2. Fill the step at the lead sheath leading edge using Scotch™ 23 tape (provided) ❶ *(Figure 5)*. Build a smooth taper from lead to semi-con while taping. Provide overlaps as shown but do not exceed two highly stretched tape layers over the lead.

Figure 5



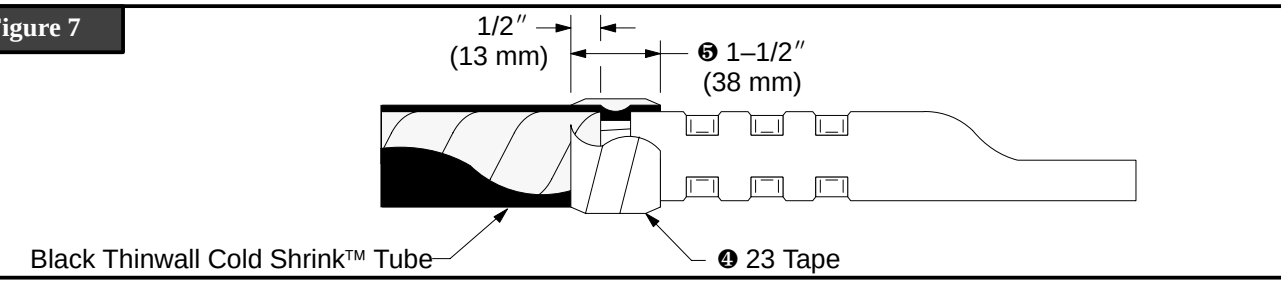
3. Mark the exposed lead sheath 3″ (76 mm) ahead of jacket cut edge ❷ *(Figure 6)* and install the black oil stop Cold Shrink™ tube to align with the maker. Position this assembly over the prepared cable end with the loose core pull tab directed toward the lug. Install by unwinding core, counter-clockwise and guiding the rubber tube to the marker as it begins to shrink. Release your grip on the Cold Shrink™ assembly once the tube has made secure contact with the lead. Finish by handling only the loose core ribbon.
4. The ideal tube-to-lug-barrel overlap is 1/2″ (13 mm) ❸ *(Figure 6)*. Trim off excess tubing.

Figure 6



5. There will be a depression in the Cold Shrink™ tube at the cable insulation-to-lug barrel gap. Fill this depression with highly stretched 23 tape wraps ❹ *(Figure 7)* to the level of the Cold Shrink™ tube surface. Continue wrapping with two final half-lapped layers of 23 tape extending 1/2″ (13 mm) on each side of the gap. The finished tape band should be 1–1/2″ (38 mm) wide ❺ *(Figure 7)*. On some smaller sized copper conductors, the lugs will be much smaller in O.D. than the paper insulation. In these cases, the 23 tape should be applied so that there is a smooth ramp build up from the lug to the paper insulation. Also, the 23 tape should extend 1/8″ beyond the EPDM tube.

Figure 7

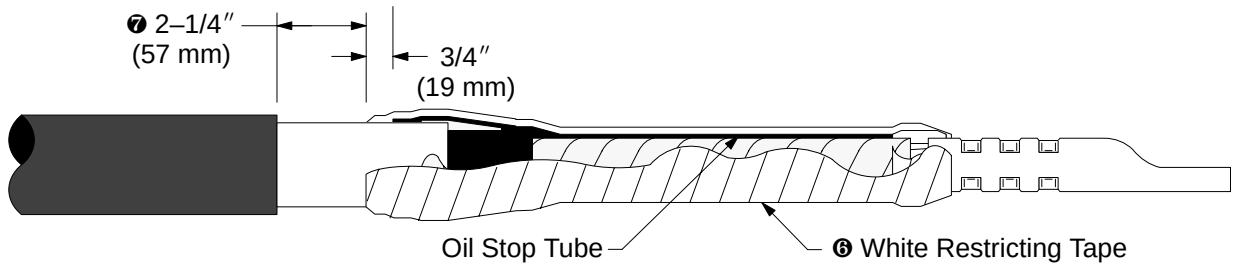


Install Oil Stop (continued)

6. Apply 4 half-lapped layers of white restricting tape over the installed Cold Shrink™ oil stop tube, as shown ❻ *(Figure 8)*. Start and end tape 2–1/4″ (57 mm) ❼ *(Figure 8)* from end of cable jacket (3/4″ (19 mm) beyond Cold Shrink™ tube end). **The tape does not stretch, but should be applied with constant tension**, to avoid wrinkling, and restrict the oil. The tape must extend beyond the 23 tape onto the lug.

NOTE: When going up ramps or over uneven surfaces, the thumb can be used to smooth out the tape as it is applied. Wrinkles do not effect the functionality, but the tape should be applied as wrinkle free as possible.

Figure 8



D. Install Ground Braid

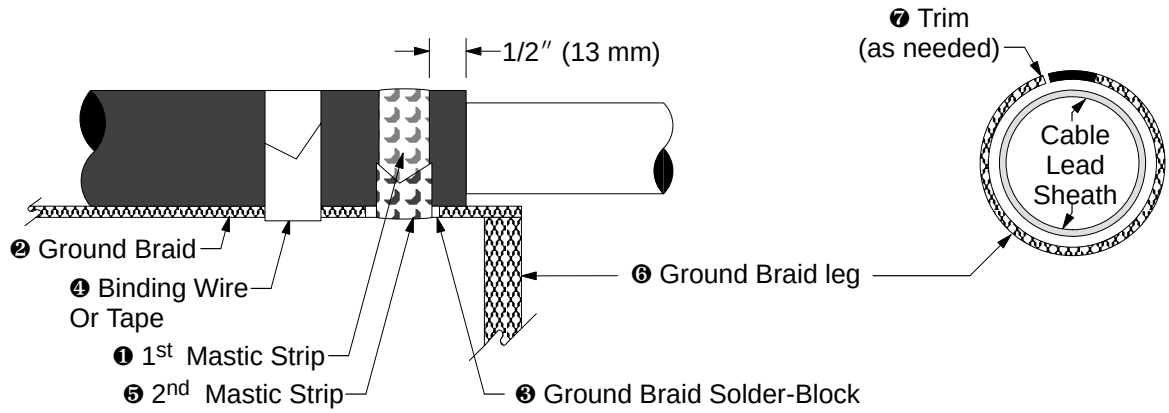
1. Select one of two mastic seal strips from kit, remove white release liners and using light tension, wrap a mastic band around cable jacket 1/2″ (13 mm) from cut edge ❶ *(Figure 9)*.

2. Position ground strap with tail (longer end) ❷ *(Figure 9)* extending over jacket. Place the solder block section ❸ *(Figure 9)* over sealing mastic. To ease installation, secure ground braid tail to cable jacket using binding wire or tape ❹ *(Figure 9)*.

3. Using *step 1* technique, apply second sealing mastic strip directly over ground braid solder block and previously wrapped mastic ❺ *(Figure 9)*.

4. Lay ground braid leg ❻ *(Figure 9)* around the lead sheath and trim its length to prevent overlap as needed ❼ *(Figure 9)*

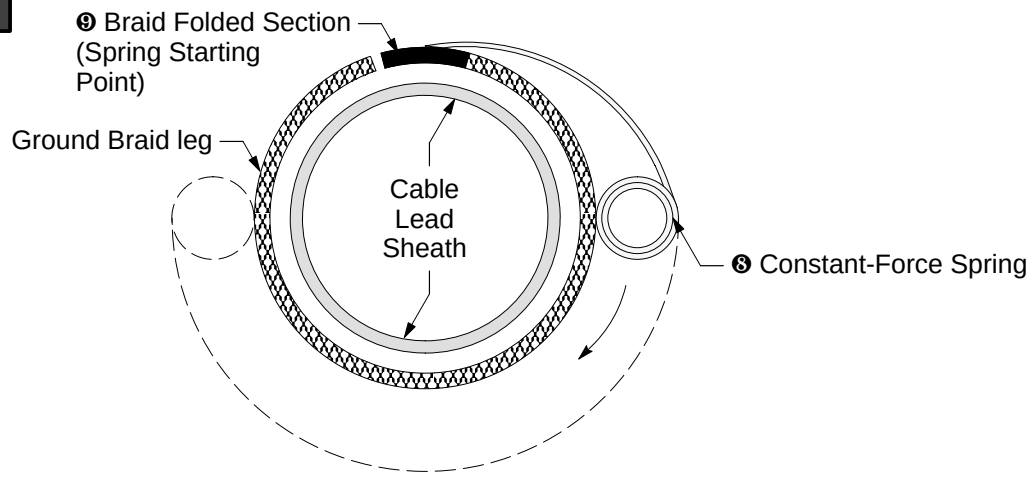
Figure 9



Install Ground Braid (continued)

5. Secure Ground Braid leg to cable lead sheath using Constant-Force Spring ❽ *(Figure 10)*. Start the spring on braid folded section ❾ *(Figure 10)* and wrap Ground Braid leg and spring together in a common direction (clockwise, viewed from cable end). Cinch (tighten) the spring after wrapping the final winding.

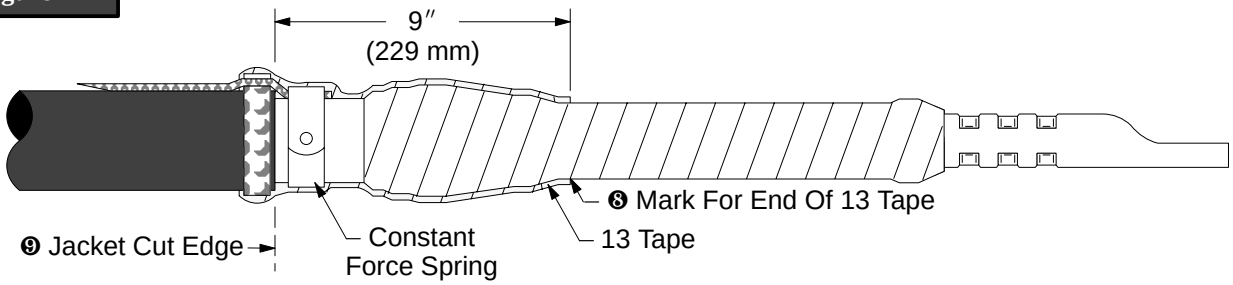
Figure 10



6. Mark the white restricting tape 9″ (229 mm) from the jacket cut edge ❽ ❾ *(Figure 11)*.

7. Apply one half-lapped layer of Scotch™ 13 tape from the cable jacket, over the mastic seal and constant-force spring; extending to the mark ❽ *(Figure 11)* applied in step 7. Provide a smooth tape leading edge by extending the 13 tape back on itself for two wraps before trimming.

Figure 11

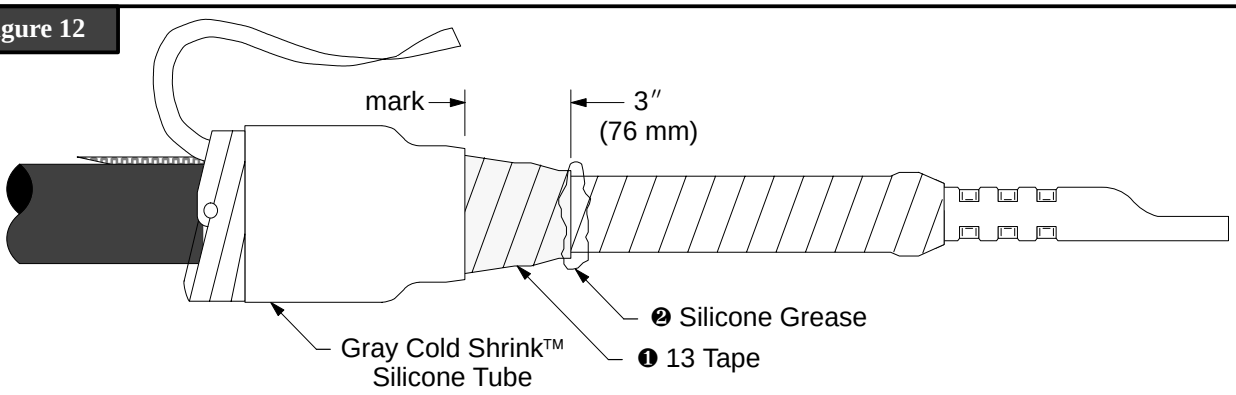


E. Install Termination

1. Mark the 13 tape 3″ (76 mm) from leading edge ❶ *(Figure 12)*. Install the gray silicone Cold Shrink™ tube beginning at the marked location. Follow procedures as outlined previously for installing a Cold Shrink™ tube.

2. Cover the end of the 13 tape with silicone grease ❷ *(Figure 12)*. This grease is not used as a lubricant, but rather to fill the potential air void at the 13 tape leading edge step.

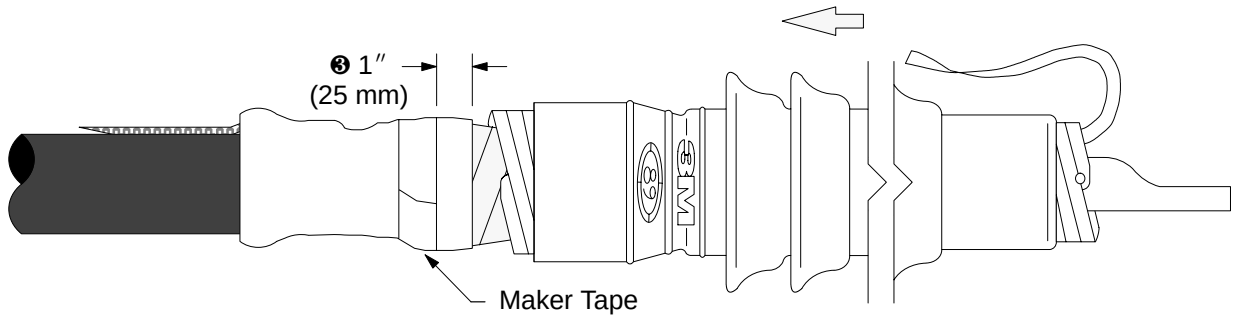
Figure 12



Install Termination (continued)

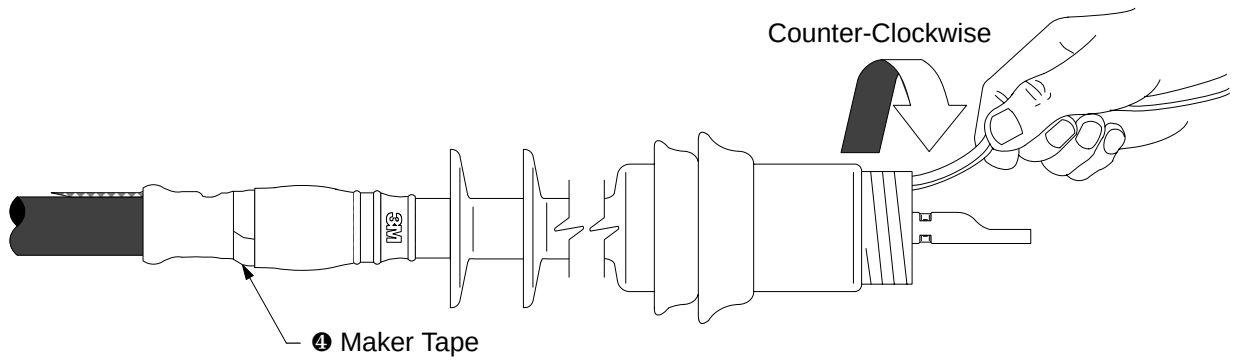
3. Place marker tape on gray Cold Shrink™ tube, 1 ″ (25 mm) from end ❸ *(Figure 13)*.

Figure 13



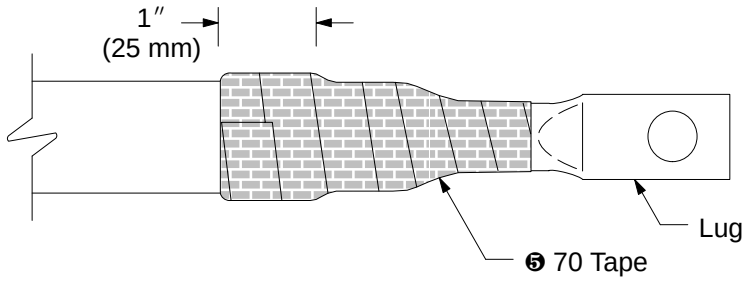
4. Install termination by aligning termination base (not the core) with marker tape ❹ *(Figure 14)*. Continue installation as previously outlined for installing Cold Shrink™ tubes.

Figure 14



5. Seal end of termination with 4 half-lapped layers of Scotch™ 70 tape, over lug barrel and onto termination insulator for 1″ (25 mm) ❺ *(Figure 15). Apply silicone tape with minimal tension (i.e. just enough to prevent folds or pleats).*

Figure 15



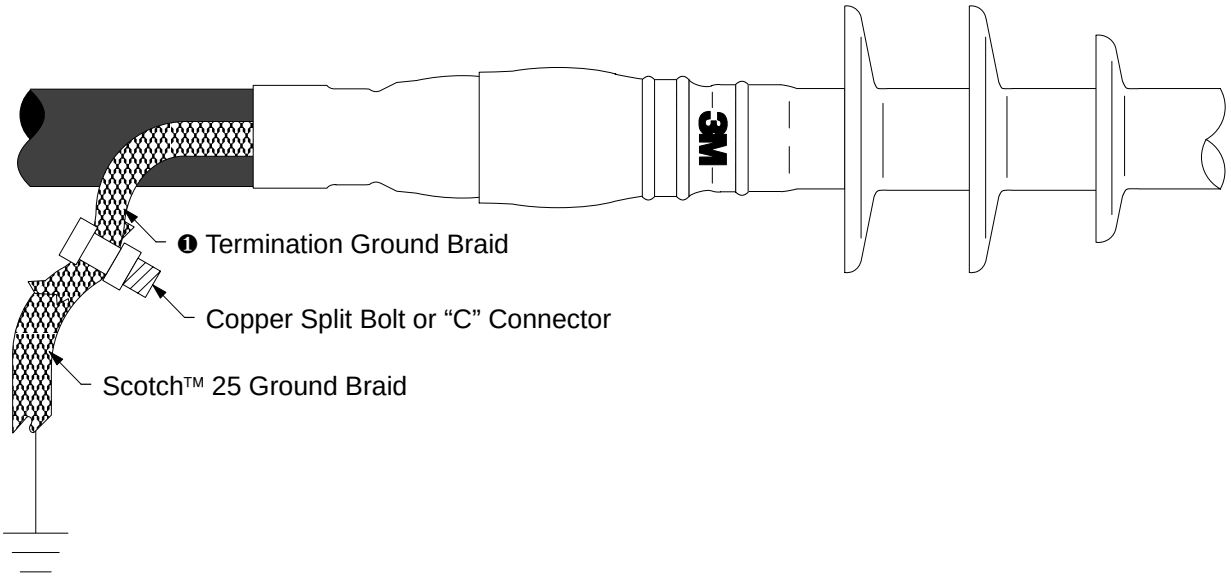
F. Grounding

1. If cable is to be grounded at termination, the following shows a typical connection. **Use braid or wire appropriately sized for system requirements.**

Termination Ground Braid ❶ is copper conductor equivalent of 7 AWG.

2. Scotch™ 25 Grounding Braid (6 AWG copper equivalent) is normally considered suitable for general grounding requirements.

TYPICAL TERMINATION GROUNDING CONNECTION



Tooling Index

Lug and Crimping Information 3M Oil Stop Copper Lugs

Cable Size AWG/ kcmil	Stud Size (in.)	Scotchlok™ Copper Lug Number	CRIMPING TOOL-DIE SETS (NO. OF CRIMPS)							
			Burndy Corporation				Thomas & Betts Corporation			Square D Co. Anderson Div.
			MD6	MY29	Y34A	Y35, Y39 Y45*, Y46*	TBM 5	TBM 8	TBM 15	VC6–3, VC6–FT**
2	3/8	OS0001	W162(2)	2 AWG(1)	A2CR(1)	U2CRT(2)	Brown(1)	Brown(1)	33(1)	Universal(2)
1/0	3/8	OS0010	W163(2)	1/0(1)	A25R(1)	U25RT(1)	Pink(2)	Pink(2)	42H(2)	Universal(1)
2/0	3/8	OS0020	W241(2) W241(3)	2/0(1) 2/0(2)	A26R(1) A26R(2)	U26RT(2) U26RT(3)	Black(2) Black(3)	Black(2) Black(3)	45(1) 45(2)	Universal(1) Universal(2)
3/0	1/2	OS0030	W243(2) W243(3)	3/0(1) 3/0(2)	A27R(1) A27R(2)	U27RT(2) U27RT(3)	Orange(2) Orange(3)	Orange(2) Orange(3)	50(1) 50(2)	Universal(2) Universal(3)
4/0	1/2	OS0040	BG(3) BG(4) BG(4)	4/0(1) 4/0(2) 4/0(2)	A28R(2)	U28RT(2) U28RT(3) U28RT(3)	Purple(2) Purple(3) Purple(3)	Purple(2) Purple(3) Purple(3)	54H(2) 54H(3) 54H(3)	Universal(2) Universal(3) Universal(3)
250	1/2	OS0250	W166(4)	250(2)	A29R(2)	U29RT(3)	Yellow(2)	Yellow(2)	62(2)	Universal(2)
350	1/2	OS0350	—	—	A31R(2)	U31RT(3)	—	Red(4)	71H(4)	—
500	1/2	OS0500	—	—	A34R(2)	U34RT(3)	—	Brown(4)	87H(4)	—
750	1/2	OS0750	—	—	—	Y39, Y45, Y46: U39RT(5)	—	—	106H(4)	—
1000	1/2	OS1000	—	—	—	Y45: S44RT(6) Y46: P44RT(6)	—	—	125H(4)	—

CRIMPING TABLE FOR 3M STEM TYPE CONNECTORS						
Conductor Size	**3M Stem Connector No.**	**Manufacturer**	**Mech. tool**	**Die (No. Crimps)**	**Hydraulic Tool**	**Die (No. Crimps)**
4 2,1 1/0	SC0002 SC0001 SC0010	Burndy	MD6	BG (4), W–243 (4)	Y35, Y39, Y45**	U25ART (2), U243 (2)
		Kearny	0–51, 0–52	5/8 (4)	—	—
		T&B	TBM 8	OLIVE (2)	TBM 15	50* (2)
		Anderson	—	—	VC6	Universal (2)
2/0 3/0 4/0	SC0020 SC0030 SC0040	Burndy	MD6	W660 (3), 840* (5)	Y35, Y39, Y45**	U28ART (2)
		Kearny	0–51, 0–52	840* (5)	WH–1, WH–2	840 (2)
		T&B	TBM 8	WHITE (4)	TBM 15	66 (3)
		Anderson	—	—	VC6	Universal (2)

NOTE: When installing in enclosed switchgear or transformers, maintain clearance required by equipment manufacturers.
* Excess flash must be filed off to round off connector.
** Usable with U–die adapter PT6515.

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