

# 3M™ Cold Shrink Silicone Rubber Outdoor Termination Kit QT-III 7690-S-INV-3W Series

For 3-Conductor Copper Tape Shield Cables  
without Ground Wires

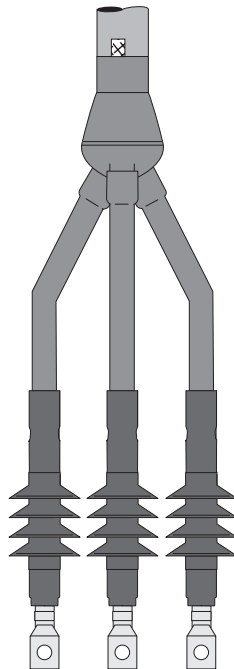
## Instructions

IEEE Std. No. 48

Class 1 Termination

### **⚠ 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 Contents

- 1 Cold Shrink Silicone Rubber Breakout Boot Assembly
- 3 Silicone Rubber Phase Re-jacketing Sleeve Assembly
- 3 Cold Shrink Silicone Rubber Termination Assembly
- 3 Cold Shrink Silicone Rubber Skirt Assembly
- 1 Roll Tinned Copper Ground Braid
- 3 Constant-Force Spring (Small)
- 1 Constant-Force Spring (Large)
- 2 Mastic Seal Strips
- 1 Roll Vinyl Tape1
- 1 Cable Preparation Kit
- 1 Installation Instructions
- 3 Copper Foil Tape, 1/2" x 10"

## Termination Application Ranges

(Final determining factor is cable insulation diameter. Listed insulation ranges allow +2.54 mm (0.10") for shielding.)

Kit Number	Cable Insulation Range [inch (mm)]	3.3 kV (mm <sup>2</sup> ) IEC	3.3 kV (mm <sup>2</sup> ) JIS	5.0 kV (AWG) AEIC	6.6 kV (mm <sup>2</sup> ) JIS	6.6 kV (mm <sup>2</sup> ) IEC	8.7 kV (AWG) AEIC	10 kV (mm <sup>2</sup> ) IEC	15 kV (mm <sup>2</sup> ) IEC	15 kV (AWG) AEIC	20 kV (mm <sup>2</sup> ) IEC	25/28 kV (AWG) AEIC
7693-S4-INV-3W	0.92-1.18 (23.4-30.0)	240-300	200-250	500-750	150-250	185-300	400-600	185-300	120-185	250-450	95-185	2/0-250
7695-S4-INV-3W	1.18-1.52 (30.0-38.6)	—	300-325	800-1000	300-325	—	750-1000	—	200-325	500-750	240-300	300-500

**Table 1**

## 1.0 Prepare Cable

- 1.1 Determine cable jacket removal length required for correct phase spacing and bolted terminal lug connections ([A] + [B] Figure 1, based on the longest phase to be connected). Allow for dimension [C] as needed.

**Note:** Individual phase length and separation dimensions vary according to specific installation and equipment design requirements. They must, therefore, be determined by the installer and must conform to accepted engineering practices.

- 1.2 Remove cable jacket, armor, bedding (inner sheath) and core fillers according to Figure 1 dimensions. Secure each copper tape shield end with a temporary band of vinyl tape (① Figure 1).
- 1.3 Using light tension, wrap a mastic seal strip around cable jacket 25 mm (1.0") below the cut edge (② Figure 1).

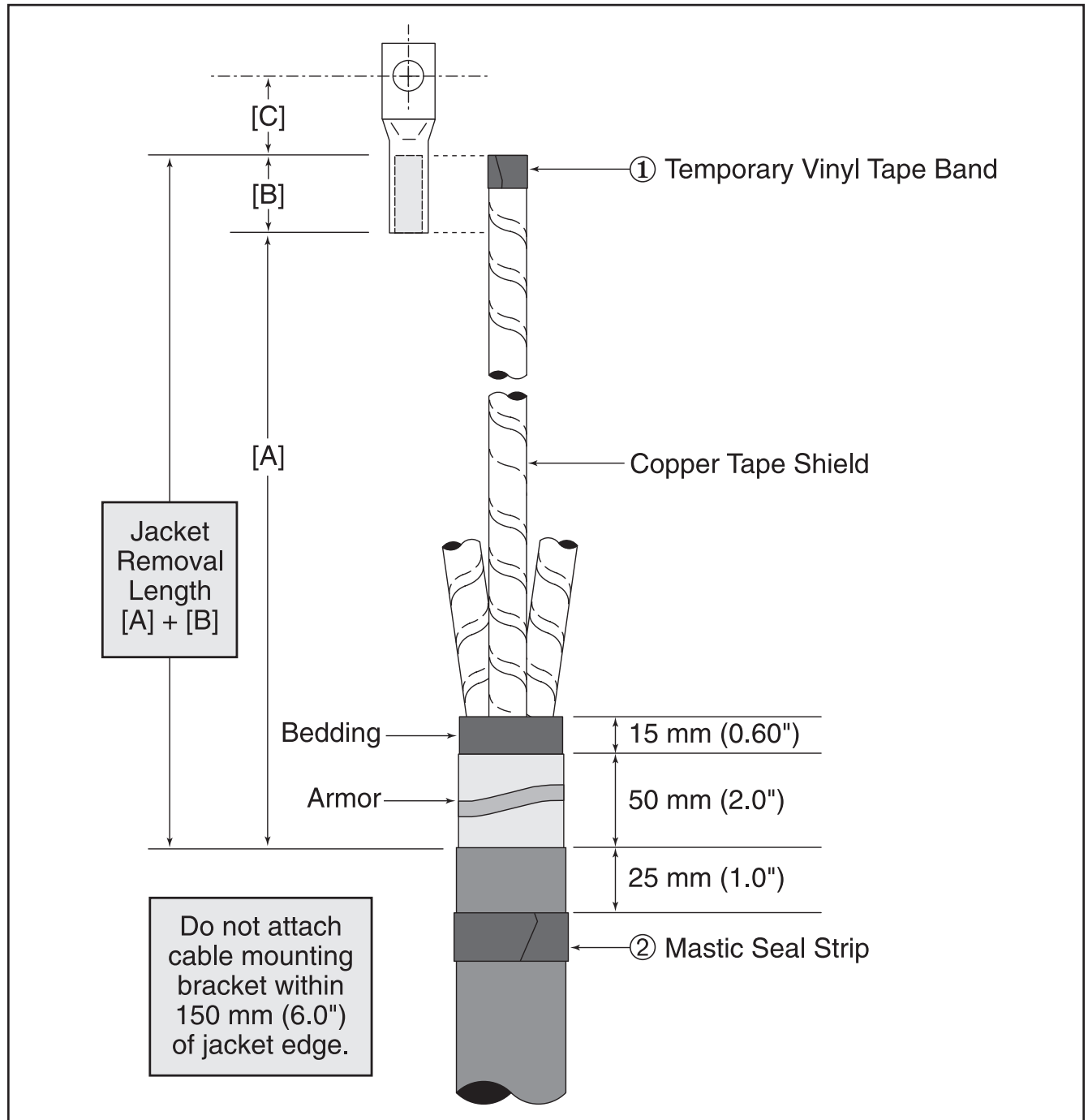


Figure 1

## 2.0 Attach Metallic Shield Grounding Braids

- 2.1 Cut supplied tinned copper grounding braid into three equal 2' (610 mm) lengths. Expand each braid end for a distance of 12" (300 mm) (② Figure 2).

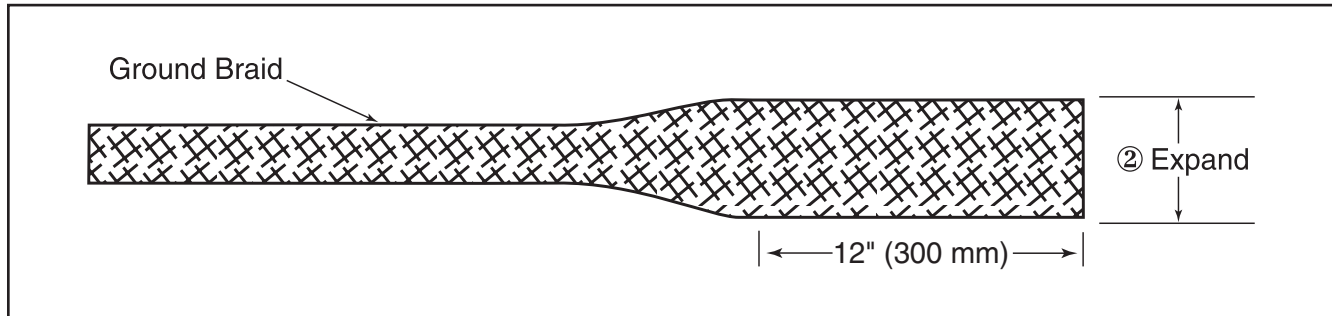


Figure 2

- 2.2 Position each expanded ground braid end over cable as shown in Figure 3. Using vinyl tape bands, secure upper braid end to copper tape shielding 200 mm (8.0") beyond armor edge (jacket edge for non-armored cable) (④ Figure 3). Secure to cable jacket 15 mm (0.60") below mastic seal strip (⑤ Figure 3).

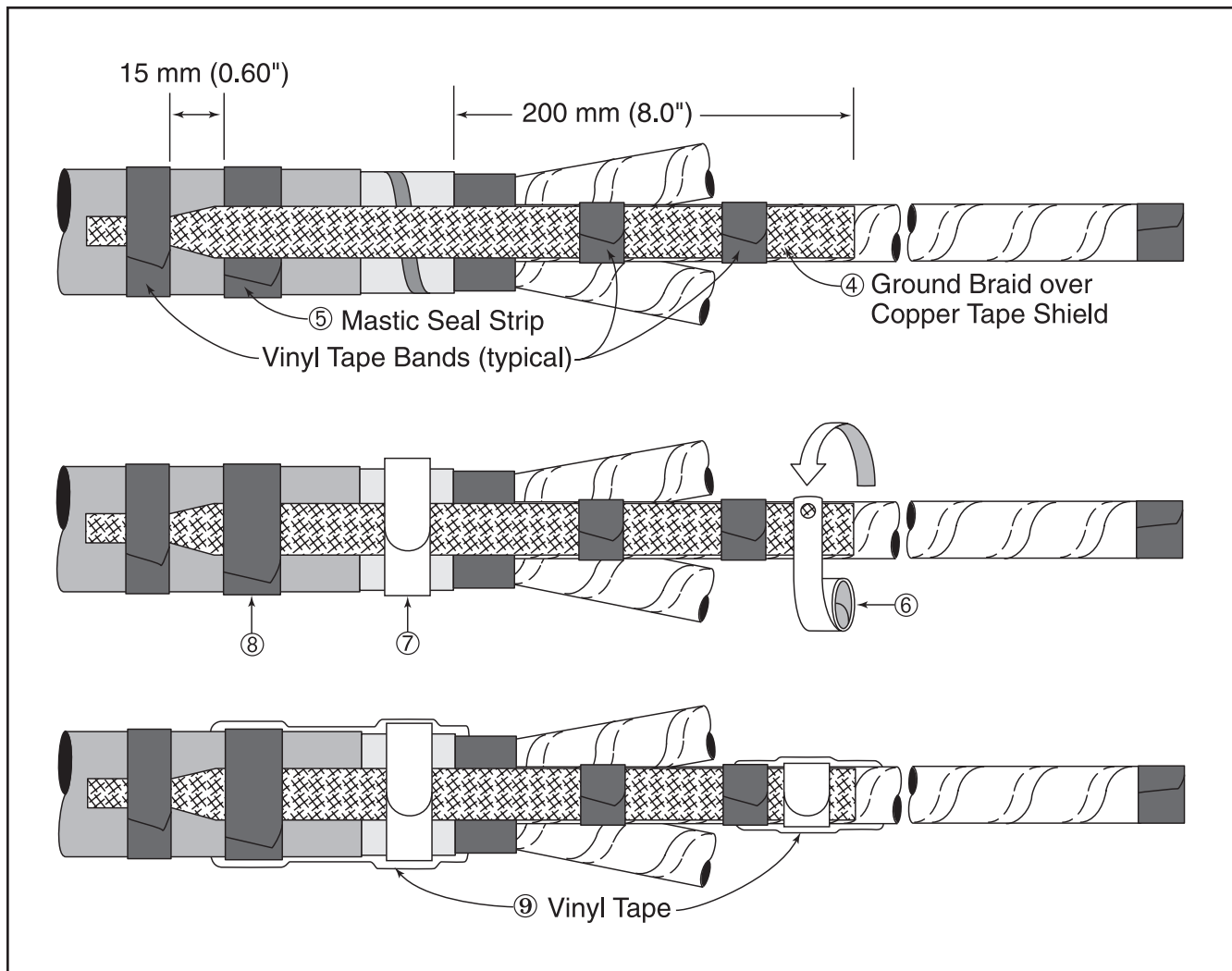


Figure 3

- 2.3 Connect ground braid upper ends to copper tape shield using small constant force spring (⑥ *Figure 3*).  
**Armored cables:** Connect three ground braids to cable armoring using one large constant force spring (⑦ *Figure 3*). Following application, cinch (twist with hand) each spring to tighten.
- 2.4 Apply a second mastic seal strip over ground braids and previously-applied mastic strip (⑧ *Figure 3*).
- 2.5 Apply two highly stretched half-lapped layers vinyl tape over mastic seal strips and constant force springs (⑨ *Figure 3*).

### 3.0 Install Cold Shrink Silicone Rubber Breakout Boot Assembly

- 3.1 Inspect boot assembly and confirm that all loose plastic core ends are free as shown (① and ② *Figure 4*).

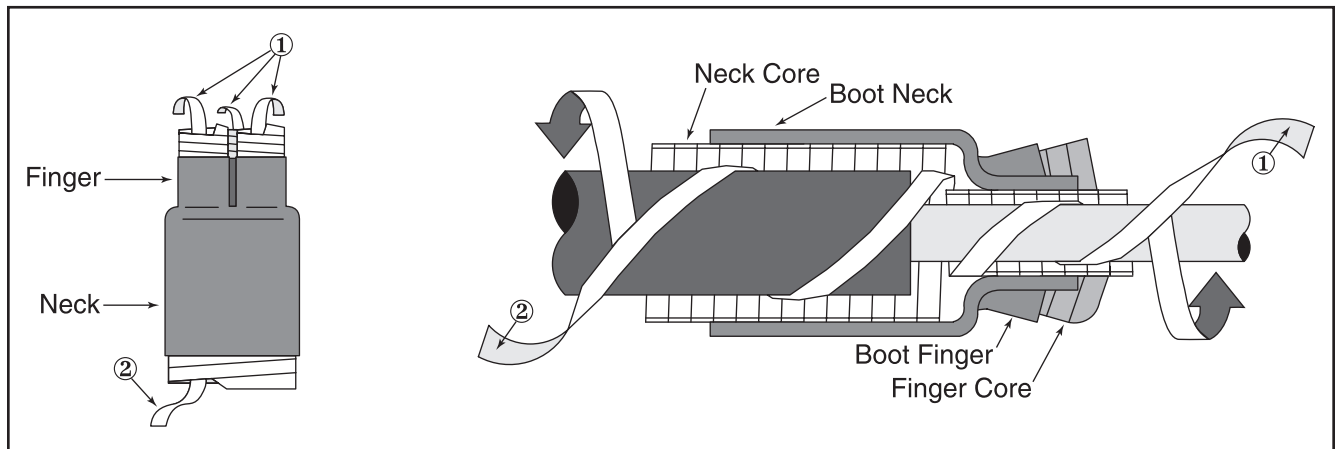


Figure 4

- 3.2 To ensure that the breakout boot can be fully seated into the breakout area of the cable, it will be necessary to unwind a few turns of each finger core.

**Caution:** Do not unwind too far such that boot fingers begin to collapse.

- 3.3 Hold loose neck-end core ribbon ② to one side so that it can not become trapped between cable phases. Slide boot assembly over cable end, guiding individual cable cores through boot assembly fingers.

**Hint:** View end of cable through finger cores to ease cable phase insertion.

- 3.4 Slide breakout boot assembly onto cable as far as it will go. Large neck-end should fully extend over cable jacket.

**Hint:** Spread cable phases while sliding boot assembly to ease the installation.

- 3.5 Remove large neck-end core. Grasping loose core ribbon end ②, pull and unwind counter clock-wise around cable.
- 3.6 Remove each finger core. Grasping loose core ribbon end ①, pull and unwind counter clock-wise around each cable phase leg.

## 4.0 Install Silicone Rubber Re-jacketing Sleeves

4.1 Place a vinyl tape marker on each cable phase leg at dimension [X] (① *Figure 5*).

**Note:**  $[X] = 320 \text{ mm (12.6") + [B]}$  (Lug barrel depth). Allow for crimp growth when using aluminum lugs.

4.2 Determine required re-jacketing sleeve length for each phase leg (Distance [S], *Figure 5*). Be sure to include 25 mm (1.0") breakout boot finger overlap in measurement.

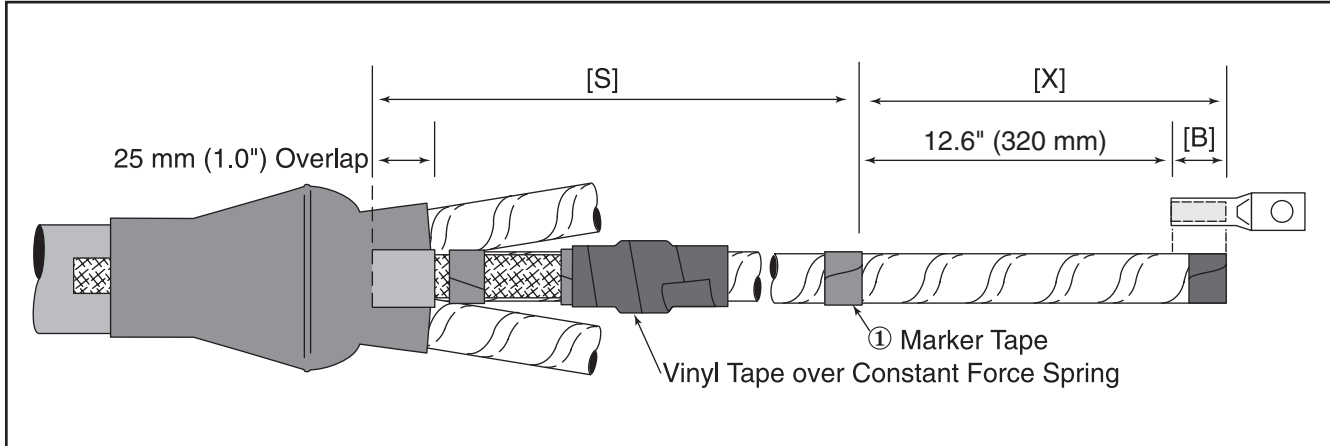


Figure 5

4.3 Using scissors, trim re-jacketing sleeve assembly to length required (*Figure 6*). Cut tubing and inner braid together.

**Note:** Inner polyester braid should extend approximately 1" (25 mm) beyond re-jacketing tube end before cutting. There is no need for termination-end braid exposure.

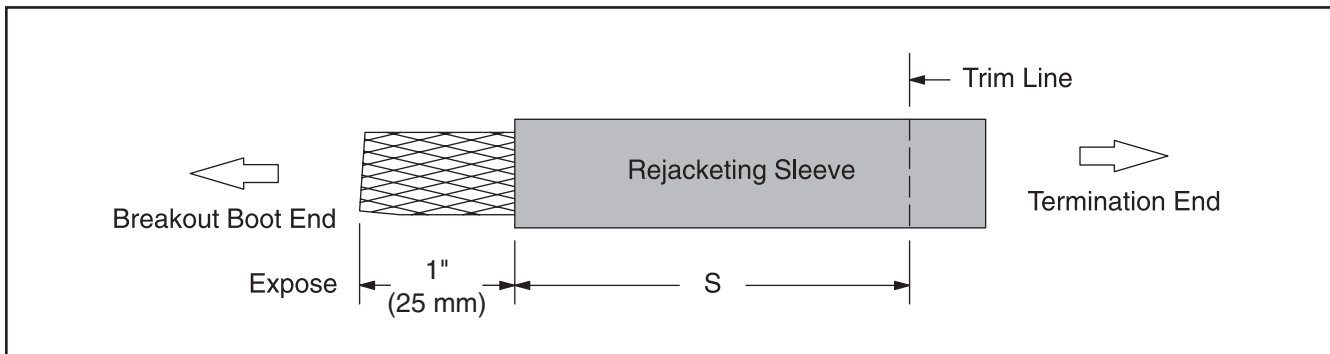


Figure 6

4.4 Guide one re-jacketing sleeve assembly over each cable phase leg (*Figure 7*).

**Push sleeve assembly from above. Continuously guide the free end maintaining sleeve-to-cable-core alignment.**

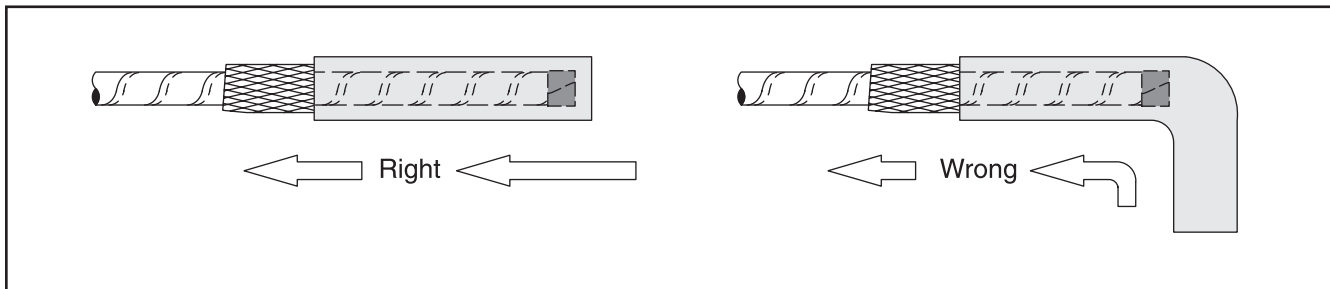


Figure 7

4.5 Slide re-jacketing sleeve until inner polyester braid is adjacent to breakout boot finger (② *Figure 8*).

4.6 Fold outer silicone tubing back on itself for 1" (25 mm) and trim off exposed polyester braid (③ *Figure 8*).

**Note:** Do not damage silicone tubing while cutting. Sleeve assembly may be rotated to ease trimming. When doing so, rotate in the direction of the cable copper tape shield wrap.

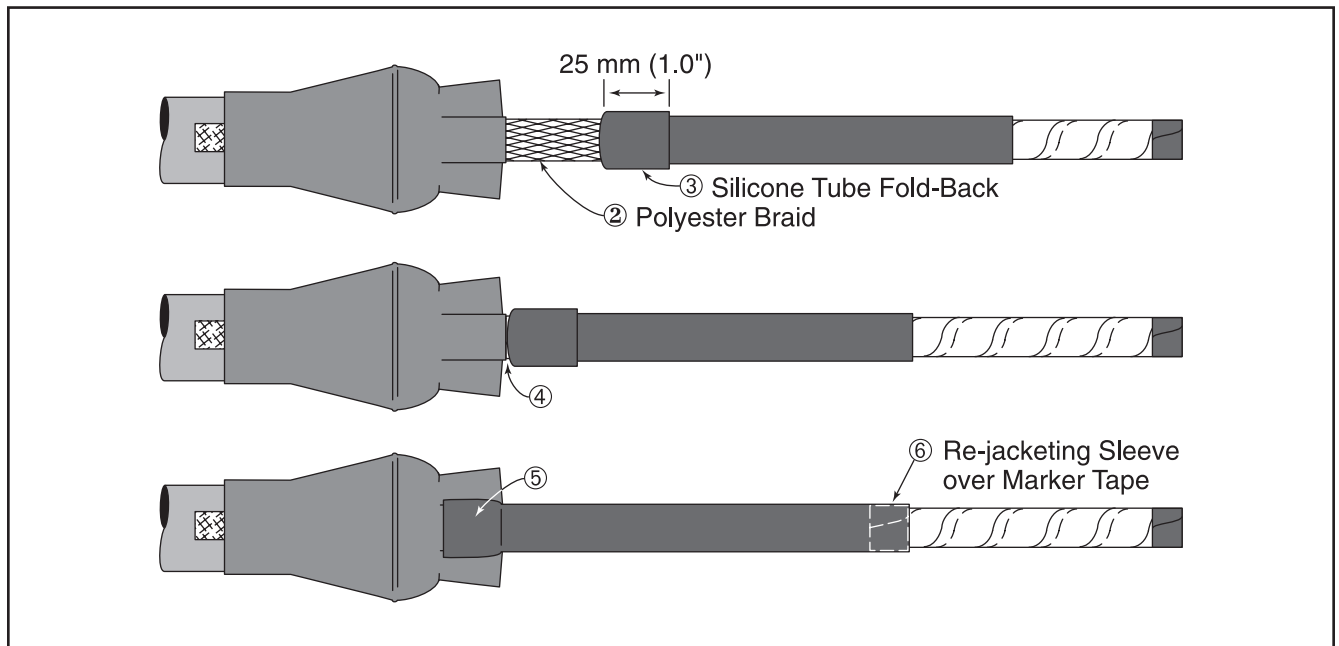


Figure 8

4.7 Slide re-jacketing sleeve assembly down until folded tube contacts edge of breakout boot finger (④ *Figure 8*).

4.8 Pull folded silicone tube section down onto breakout boot finger (⑤ *Figure 8*).

**Note:** Re-jacketing tube end should align with upper edge of installed marker tape (⑥ *Figure 8*). Minor tube adjustments can be made as needed.

## 5.0 Install 3M™ Cold Shrink Termination QT-III Assemblies

5.1 Prepare cable phase legs according to dimensions shown (*Figure 9*). “B”=Lug or connector barrel depth. Allow for crimp growth when using aluminum lugs or connectors.

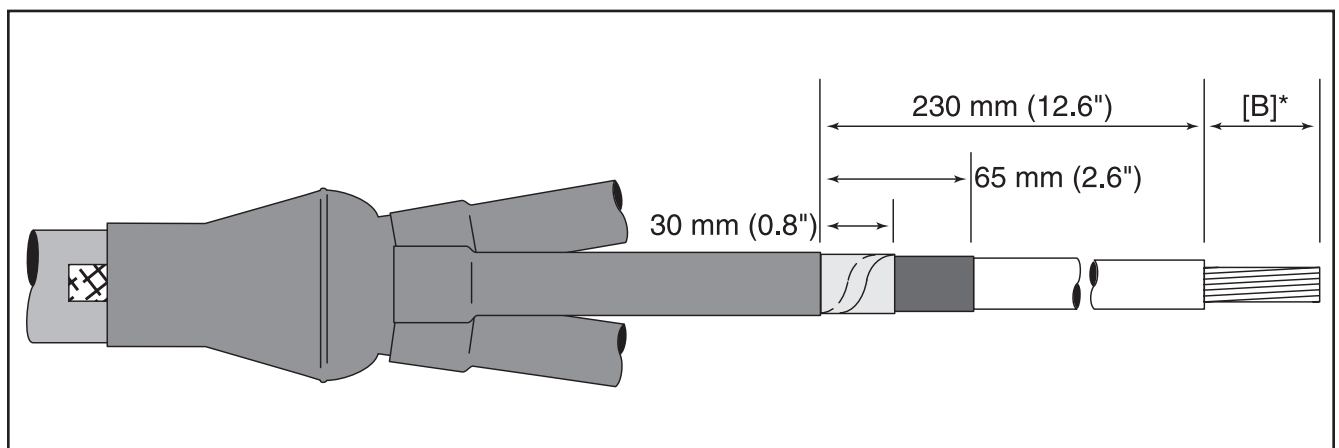


Figure 9

5.2 Secure cable copper tape shield ends with copper foil tape (*Figure 10*).

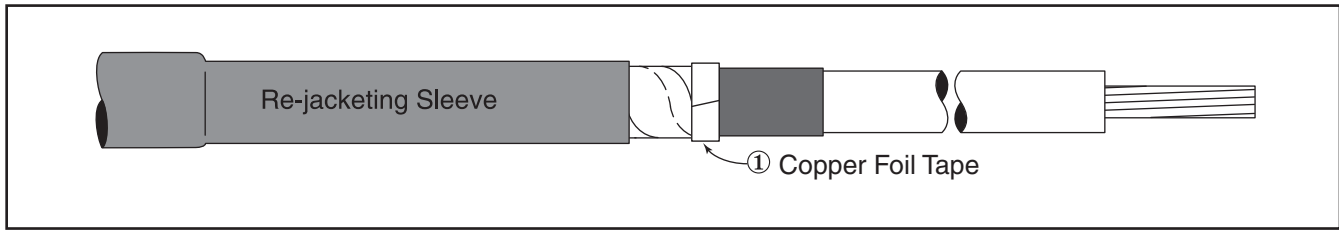


Figure 10

5.3 Secure re-jacketing sleeve with two half-lapped layers of vinyl tape (*Figure 11*). Start taping 0.8" (20 mm) over re-jacketing sleeve, extend 0.2" (5 mm) over cable metallic shield and return to starting point.

**Note: Do not cover copper foil tape.**

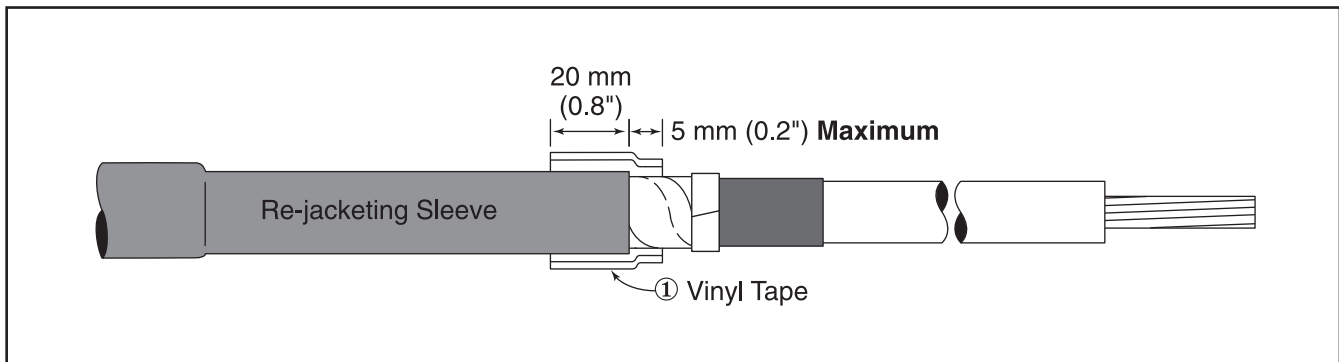


Figure 11

5.4 Place a termination installation marker tape 125 mm (4.9") back from semi-con leading edge as shown (*Figure 12*).

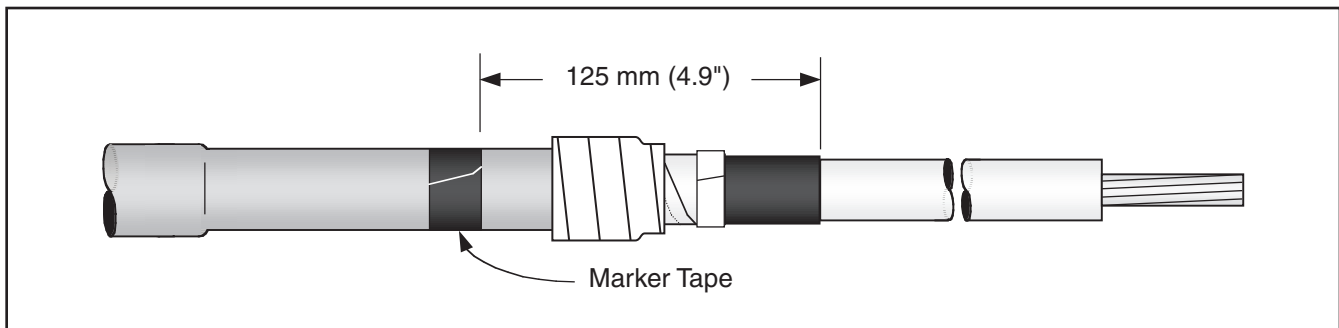


Figure 12

5.5 Install terminal lugs.

**Note: Special Case – When lug spade dimension is larger than inside diameter of white plastic termination core, position termination assemblies over cable phase legs prior to installing lugs.**

Remove inner red shipping core from each termination assembly by pulling and unwinding the loose red core ribbon. Position one termination over each cable phase leg. Each termination assembly must be positioned with its loose white core ribbon end directed toward the open (cut) end of the cable. Continue with lug installations.

- (a.) For Aluminum Conductors - Thoroughly wire brush conductor strands to remove aluminum oxide layer. Immediately insert conductor into terminal lug barrel as far as it will go.



(b.) Ensure that each lug face is parallel to equipment bushing or lug connection interface (*Figure 13*).

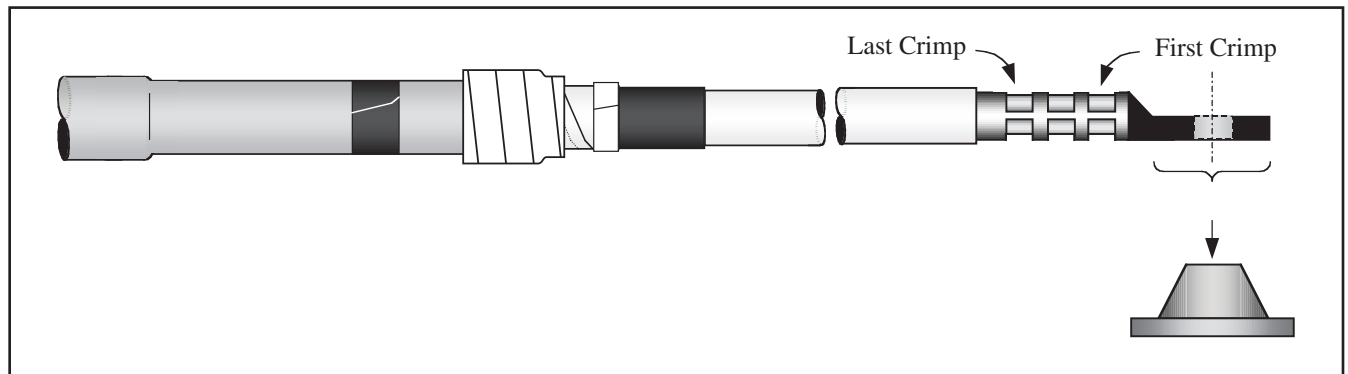


Figure 13

(c.) Crimp terminal lug according to manufacturer recommendations. Start at the upper end as shown (*Figure 13*). Remove all traces of oxide inhibitor that may have come out of lug barrel during crimping.

(d.) Thoroughly clean primary insulation and lug barrel area using solvent wipe from supplied cable preparation kit.

**Note:** *Avoid solvent contact with cable semi-conductive screen.*

#### 5.6 Install 3M™ Cold Shrink Termination QT-III assemblies.

(a.) Remove the inner red shipping core from the termination assembly by pulling and unwinding the loose red core end.

(b.) Position the termination assembly with the loose white core ribbon directed toward the terminal lug.

(c.) Align the base of the termination (not the plastic core) with the installation marker tape as shown (*Figure 14*).

(d.) Grasp the loose white core ribbon. Pull and unwind counter clock-wise around cable end (*Figure 14*).

**Note:** *After the silicone rubber termination makes adequate contact (approximately 1.0”), release the assembly and continue unwinding the core. Do not pull or push on the assembly while unwinding.*

(e.) Remove the installation marker tape.

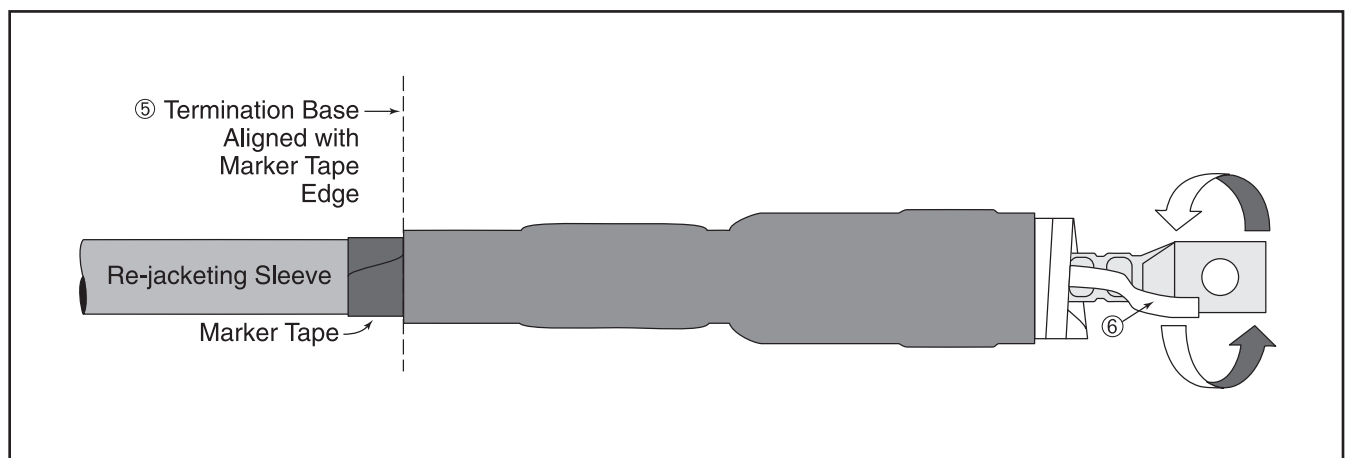


Figure 14

5.7 Install cold shrink skirted insulators.

- A. Position skirted insulator over previously installed tubular termination as shown (Figure 15).
- B. Align skirted insulator body (not the core) to install 3.5" (89 mm) from base of tubular termination (⑦ Figure 15).
- C. Grasp the loose white core ribbon (⑧ Figure 15). Pull and unwind, counter clock-wise, around cable phase end.

**Note:** After skirted insulator makes adequate contact (approximately 1.0" or 25 mm), release the assembly and continue unwinding the core. Do not pull or push on the assembly while unwinding.

5.8 Connect shield braid tail and cable ground wire to system ground (earth) according to normal practice.

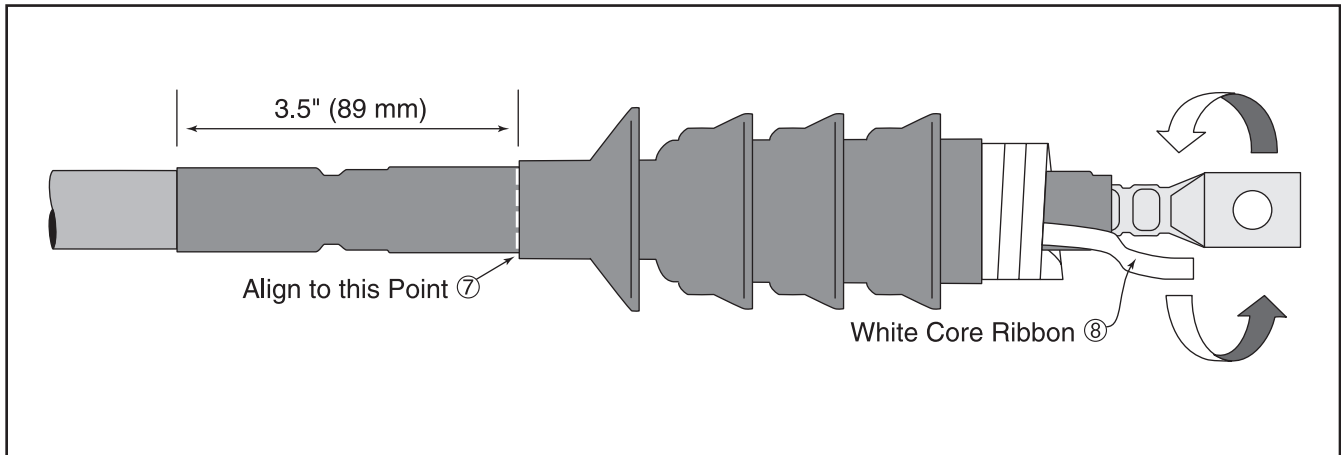


Figure 15



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