

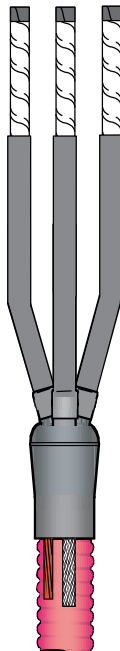
# 3M™ Single Conductor Accessory Breakout Kits (BOK's) for use with 3M™ Cable Accessories (Terminations, T-Bodies and Push-On Elbows)

For Use With Single Conductor Accessories On Three-Core Conductor Cables (Three-Conductor Type “G” (Ground Wire), Copper Tape Shield, Armored Cables, and Tray Cable without Armor)

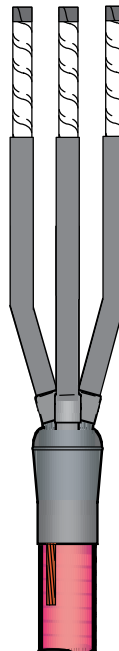
## Instructions

### CAUTION

Working around energized electrical 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.



Cable with Armor



Tray Cable without Armor

# 1.0 Required Components

## 1.1 Required Breakout Kit (BOK) That Needs to Be Ordered based on the Cable Insulation O.D. Range - See Table 1 for 3M™ Single Conductor Accessory Breakout Kit Part Numbers

1 Breakout Kit (BOK) per Three-Core Conductor Cable

**Each Breakout Kit (BOK) contains the following appropriately sized components and accessories:**

1 Cold Shrink Silicone Rubber Breakout Boot (includes 2 Strips Scotch® Mastic Strip 2230)

3 3M™ Rejacketing Sleeve RJS Series Assemblies - 4' length each

1 Constant Force Spring (Large) - **Used For Armored Cable Only**

1 Long Tail Tinned Copper Ground Braid with Solder Block - **Used For Armored Cable Only**

3 Strips Scotch® Mastic Strip 2230 (black with white release liner, bagged)

1 Roll Scotch® Super 33+™ Vinyl Electrical Tape - 3/4" x 20'

1 Roll, Scotch® Electrical Shielding Tape 24 - **For Armored Cable Only**

1 Instruction Sheet

## 1.2 Required Documentation

1 Instruction Sheet - 78-8141-7841-0

Can be downloaded from [www.3M.com/electrical](http://www.3M.com/electrical). Type document part number into Search box to locate, or,

Contact 3M at 800-245-3573 and request an electronic copy.

***NOTE: Do not use knives to open plastic bags.***

## Accessory Kit Application Ranges & Specified Breakout Kits (BOK's) based on the Cable Insulation O.D. Range

Need to order Single Conductor Accessory Kit and specified 3M™ Single Conductor Accessory Breakout Kit (BOK) based on the cable insulation O.D. (See Table 1).

**Final determining factor is cable insulation diameter.**

Table 1 - Breakout Kit (BOK) Selection Table

Breakout Kit Part Number	Cable Insulation O.D. Range, Inches (mm)	Cable O.D. Max Inches (mm)	Conductor Size Range (AWG & kcmil)									
			5 kV 100%	5 kV 133%	8 kV 100%	8 kV 133%	15 kV 100%	15 kV 133%	25/28 kV 100%	25/28 kV 133%	35 kV 100%	35 kV 133%
3C-BOK-1	0.33-0.50 (8,4-12,7)	1.94 (49,3)	8-2	6-4	6-4	6-4	—	—	—	—	—	—
3C-BOK-2	0.50-0.70 (12,7-17,8)	2.67 (67,8)	1-3/0	2-2/0	2-2/0	2-2/0	2-1	—	—	—	—	—
3C-BOK-3	0.70-0.92 (17,8-23,4)	3.10 (78,7)	4/0-350	3/0-350	3/0-350	3/0-350	1/0-4/0	2-3/0	1-1/0	—	—	—
3C-BOK-4	0.92-1.18 (23,4-30,0)	4.32 (109,7)	400-500	400-500	400-500	400-500	250-350	4/0-350	2/0-250	1-4/0	—	—
3C-BOK-5	1.18-1.52 (30,0-38,6)	4.70 (119,4)	700-1000	700-1000	700-1000	700-1000	500-750	500-750	350-500	250-500	4/0-500	1/0-350
3C-BOK-6	1.53-1.81 (38,8-46,0)	5.52 (140,2)	—	—	—	—	1000	1000	750	500-750	500-750	350-750

Table 1

## 2.0 Prepare Cable

- 2.1 Determine phase (core) 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. Max phase length = 4 ft (121,9 cm) + accessory length (from the cable preparation section of the appropriate Single Conductor Accessory Kit Instruction Sheet).

- 2.2 Remove cable jacket and armor, bedding (inner sheath) and core fillers, if applicable, according to Figure 1 dimensions. Secure copper tape shield ends with temporary bands of vinyl tape (Figure 1).
- 2.3 If cable is not armored, skip to paragraph 3.4.

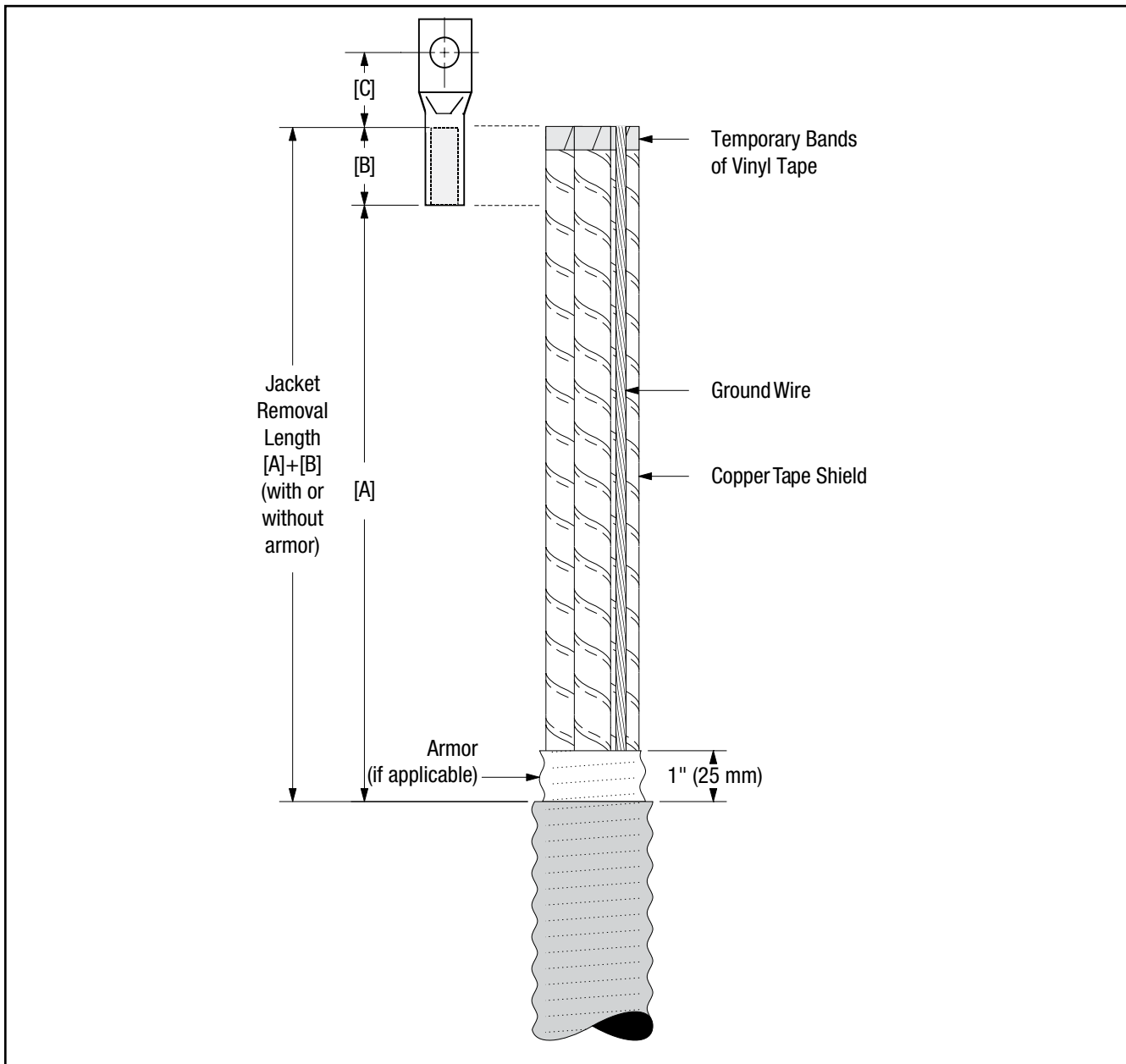


Figure 1

### 3.0 Install Armor Grounding Braid & Re-route Cable Ground Wire(s)

- 3.1 Fill one armor valley section with tightly-wrapped layers of Scotch® Electrical Shielding Tape 24 (*Figure 2*).

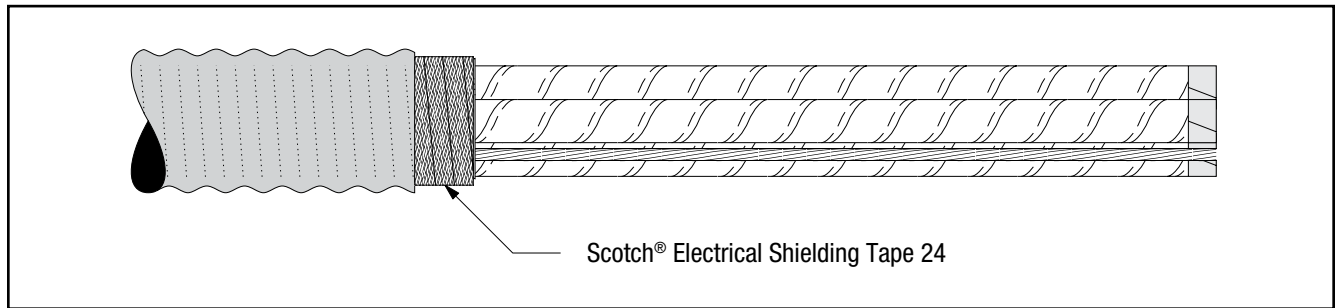


Figure 2

- 3.2 Wrap ground braid around cable armor and secure using large constant-force spring (*Figure 3*). Once spring has been applied, cinch (twist with hand) to tighten.

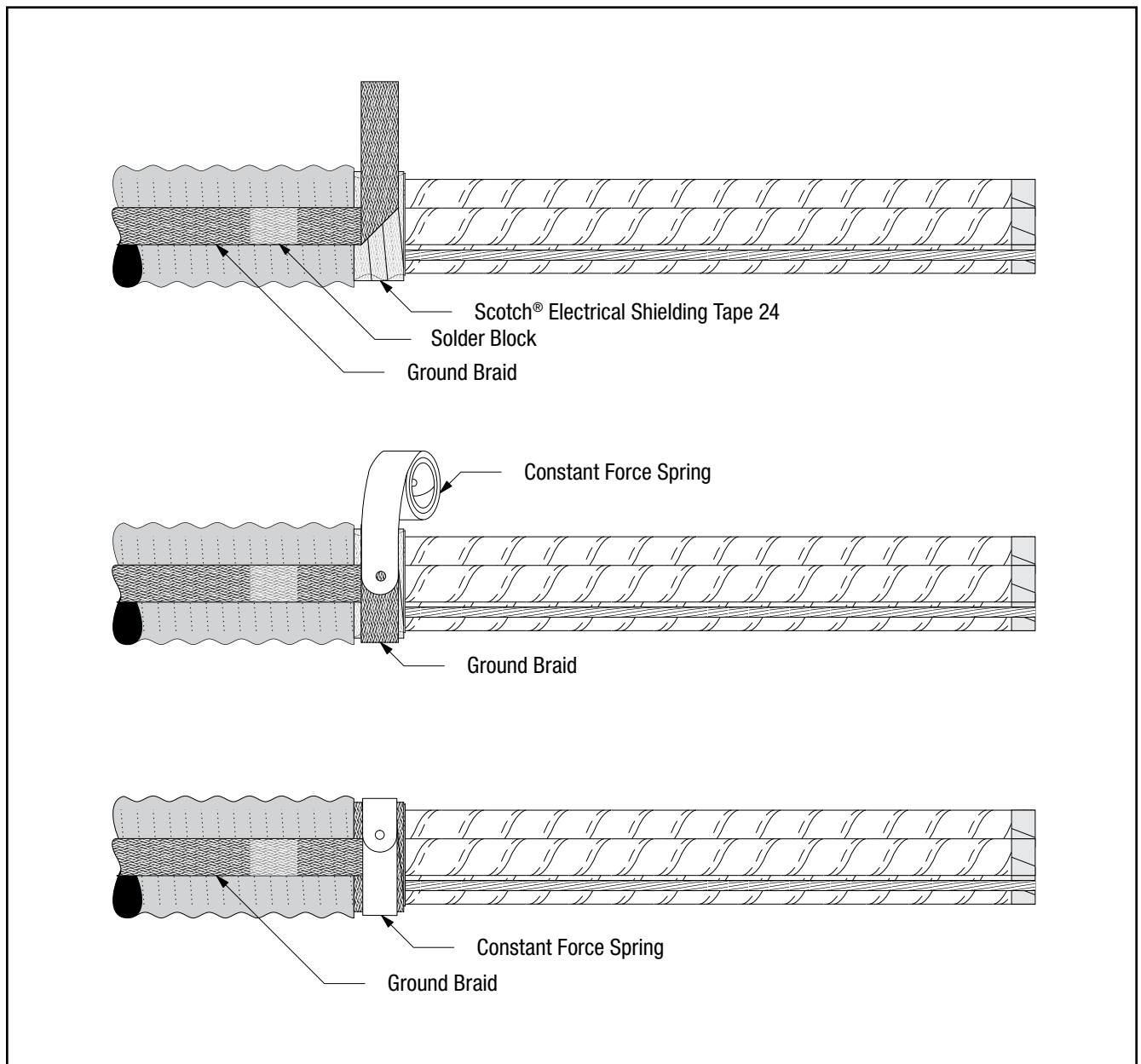


Figure 3

- 3.3 Apply one half-lapped layer Scotch® Super 33+™ Vinyl Electrical Tape over large constant-force spring and cable armor (*Figure 4*).

**Note:** Apply vinyl tape to hold down ground strap (*Figure 4*). Extend vinyl tape  $\frac{3}{4}$ " (19 mm) beyond end of armor and bind ground wires with four layers of Scotch® Super 33+™ Vinyl Electrical Tape.

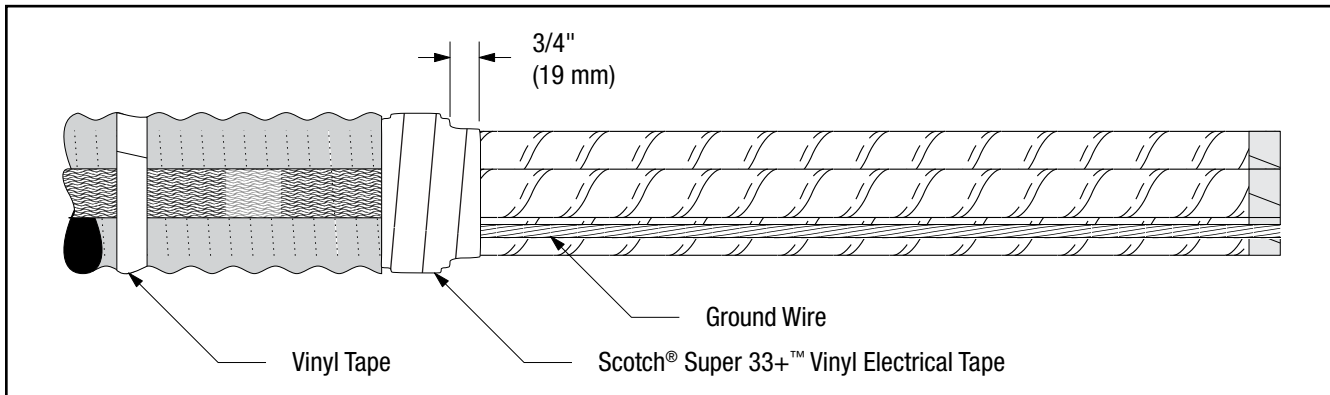


Figure 4

- 3.4 Loop cable ground wire back over jacket and armor (if applicable) (*Figure 5*). Adjust ground wire position over cable jacket to run parallel with tail of ground braid assembly, when cable is armored.

**Note:** Do not make sharp or tight bends in ground wire. Ground wire loop should not extend more than  $1\frac{1}{2}$ " (38 mm) beyond vinyl tape.

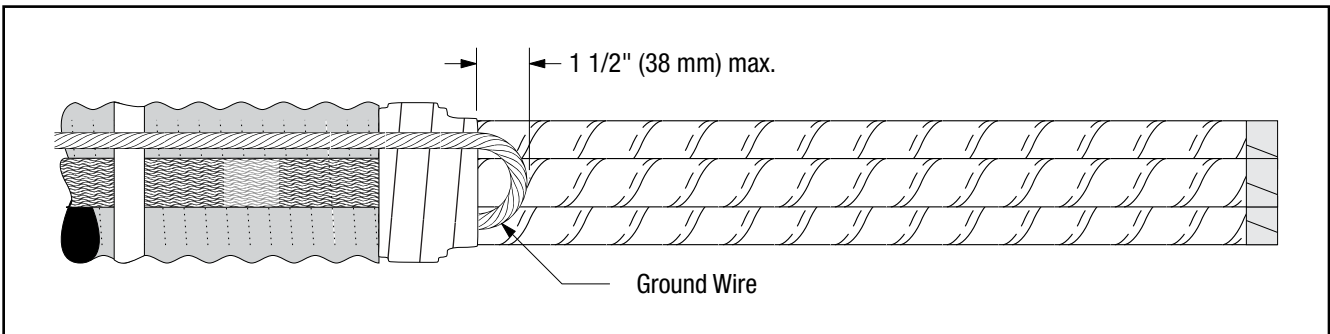


Figure 5

- 3.5 Apply two half-lapped layers of Scotch® Super 33+™ Vinyl Electrical Tape over looped ground wire area (*Figure 6*).

- 3.6 Proceed to paragraph 3.8 if cable is not armored.

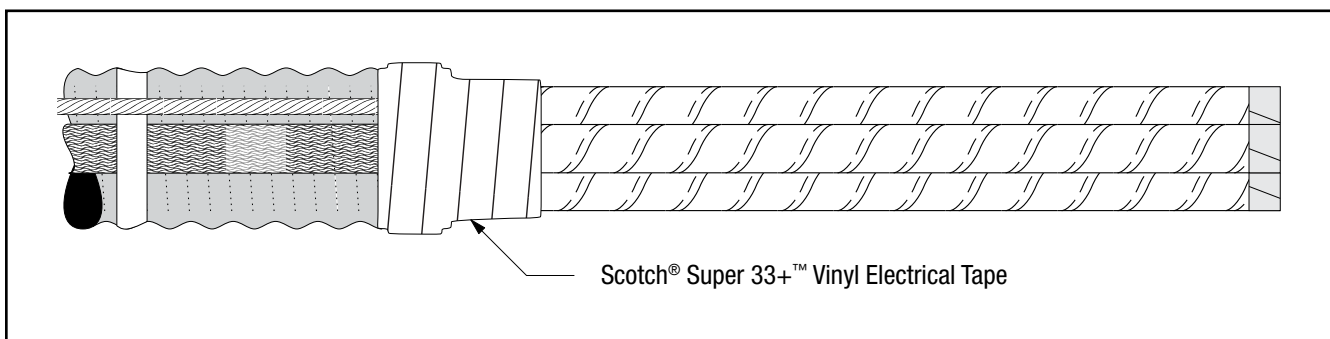


Figure 6

- 3.7 Wrap two strips of Scotch® Mastic Strip 2230 (one on top of the other) over the cable jacket. Locate the mastic strip directly under the shield braid solder block (if cable is armored) and ground wire (*Figure 7*).

**Note:** *It will be necessary to temporarily remove vinyl tape over ground braid tail to complete this step.*

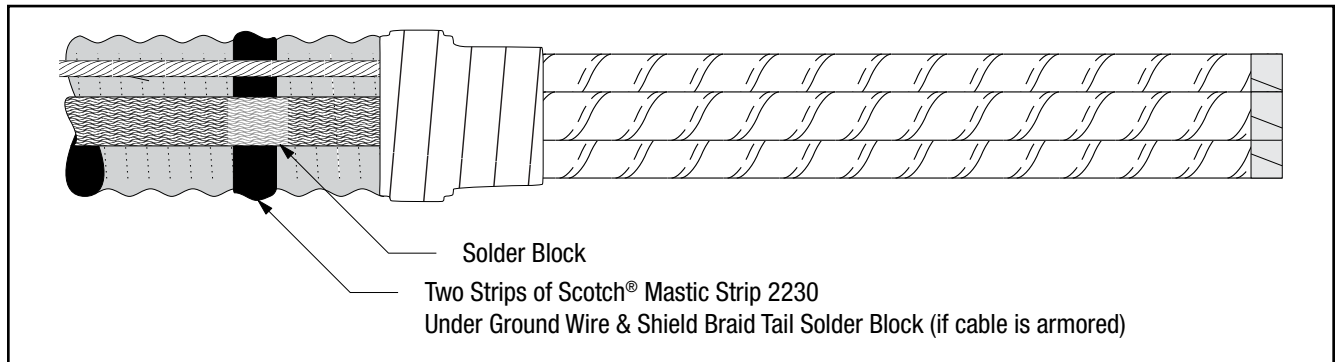


Figure 7

- 3.8 Separate ground wire strands over strips of Scotch® Mastic Strip 2230 as shown (*Figure 8*).

**Hint:** *Directly over the mastic seal strips, lift and bend the ground wire 90°. Reverse twist the ground conductor to open strands. Use a screwdriver to aid in separating the strands. On 19 strand wire with reverse twist innerconductors, twist ground wire in the opposite direction to aid in separating the inner-conductors. Flatten, straighten and reposition the separated ground conductors. Be careful not to damage ground wire.*

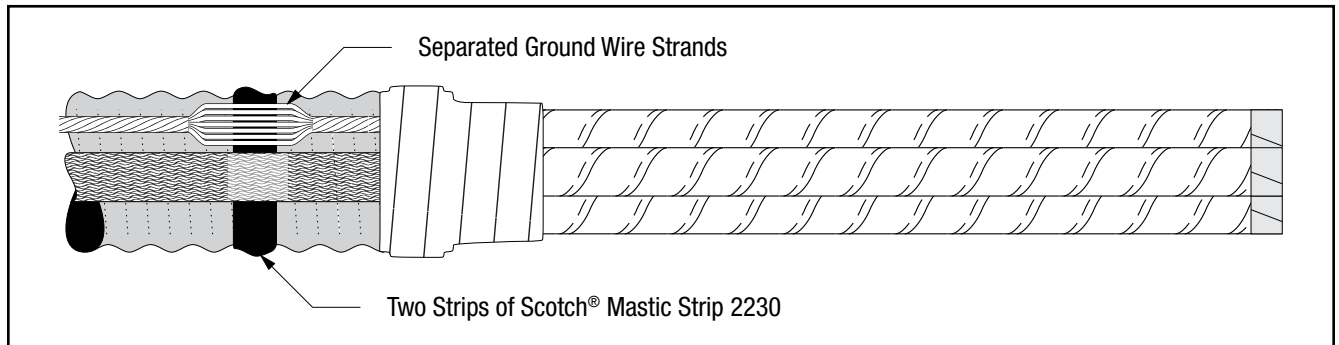


Figure 8

- 3.9 Apply one strip of Scotch® Mastic Strip 2230 around ground wire strands (*Figure 9*). Apply one strip of Scotch® Mastic Strip 2230 around solder block section of ground braid tail (if cable is armored). Align Scotch® Mastic Strip 2230 wraps with previously applied Scotch® Mastic Strip 2230 strips around cable jacket.

**Note:** *Avoid crossing individual wires at Scotch® Mastic Strip 2230 seal location.*

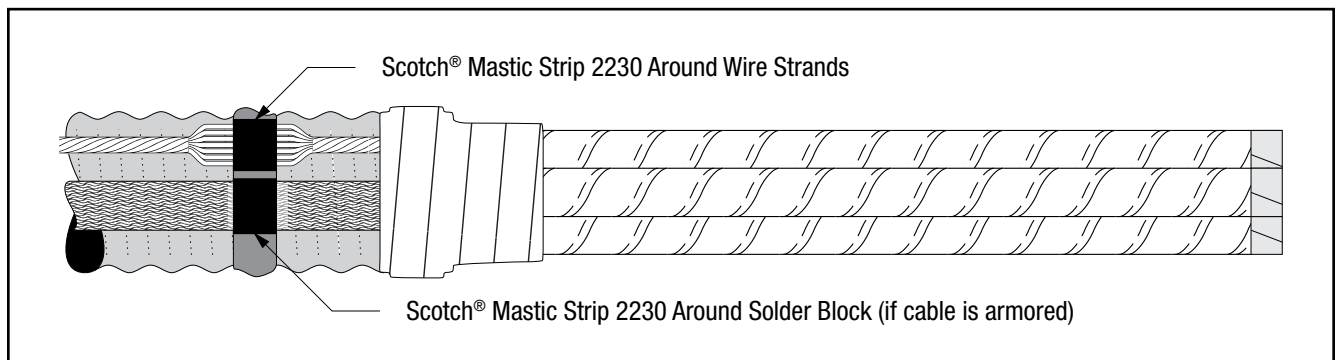


Figure 9

- 3.10 Wrap two additional strips of Scotch® Mastic Strip 2230 directly over previously applied Scotch® Mastic Strip 2230. (*Figure 10*).
- 3.11 Cover Scotch® Mastic Strip 2230 area with two highly stretched half-lapped layers of Scotch® Super 33+™ Vinyl Electrical Tape .

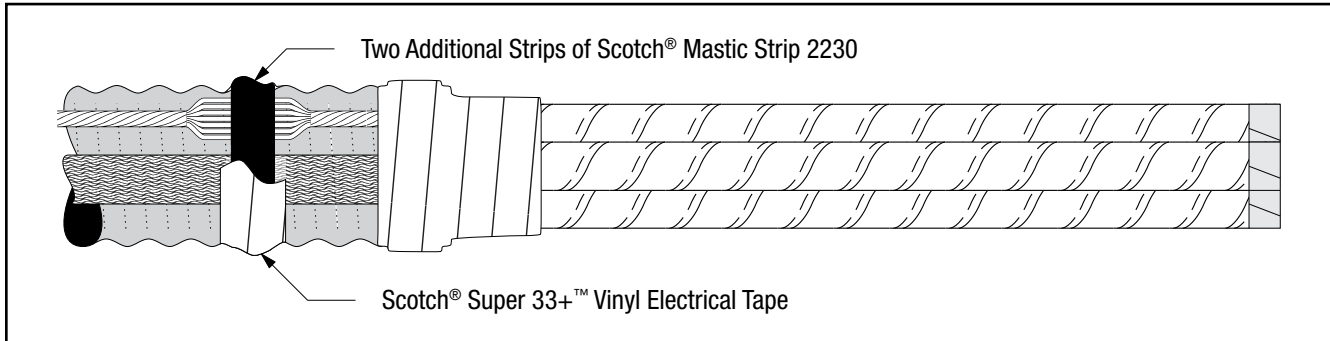


Figure 10

## 4.0 Install Silicone Rubber Breakout Boot Assembly

- 4.1 Inspect breakout boot assembly and confirm that all loose plastic core ends are free as shown (*Figure 11*).

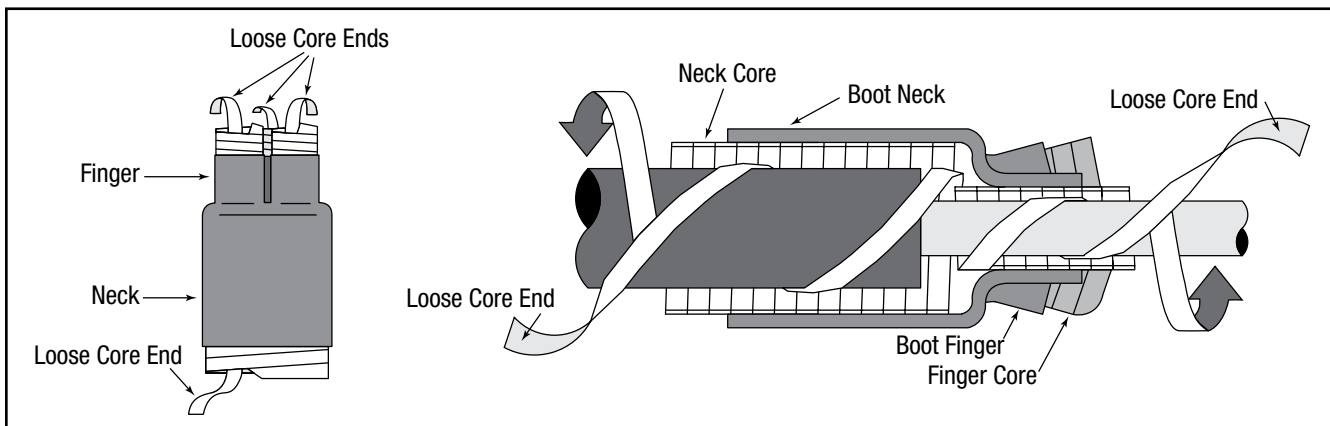


Figure 11

- 4.2 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.**

- 4.3 Hold loose neck-end core ribbon 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.**

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

**Hint: Spreading cable phases while sliding the boot assembly can ease the installation.**

- 4.5 Remove large neck-end core. Grasping loose core ribbon end, pull and unwind counterclockwise around cable.
- 4.6 Remove each finger core. Grasping loose core ribbon end, pull and unwind counterclockwise around each cable phase leg.



## 5.0 Install Silicone Rubber Rejacketing Sleeves

5.1 Determine the correct [A] dimension for the accessory being installed. Refer to the accessory cable preparation section of the appropriate Single Conductor Accessory Kit Instruction Sheet for this dimension.

5.2 Place a vinyl tape marker on each cable phase leg at dimension [X] (*Figure 12*).

**Note:**  $[X] = [A] + [B]$  Allow for crimp growth when using aluminum lugs.

**[A] = Jacket Removal Dimension from Single Conductor Accessory Instructions.**

5.3 Determine required rejacketing sleeve length for each phase leg (Distance [S], *Figure 12*). Be sure to include 1" (25 mm) breakout boot finger overlap in measurement.

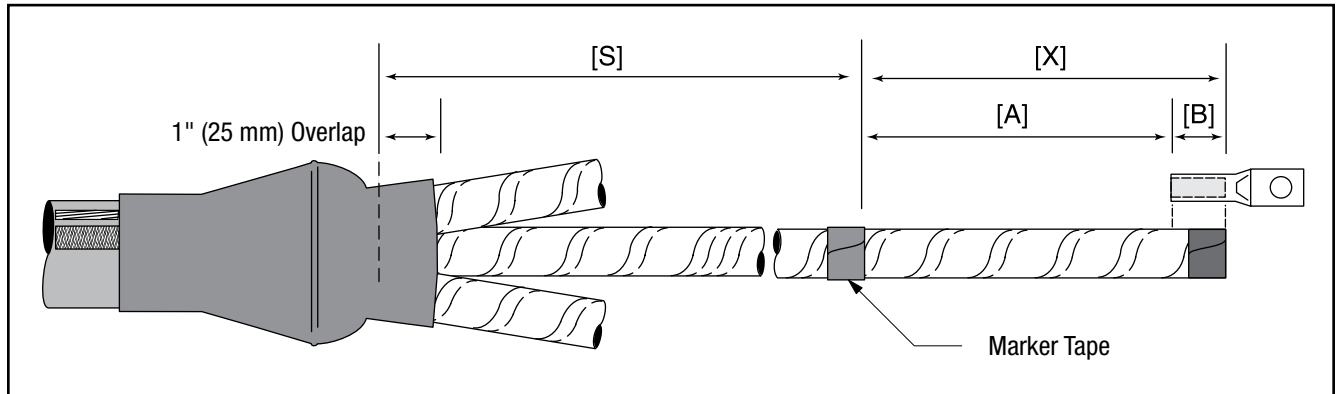


Figure 12

5.4 Using scissors, trim rejacketing sleeve assembly to length required (*Figure 13*). Cut tubing and inner braid together.

**Note:** Inner polyester braid should extend approximately 3" (76 mm) beyond rejacketing tube end before cutting. There is no need for termination-end braid exposure.

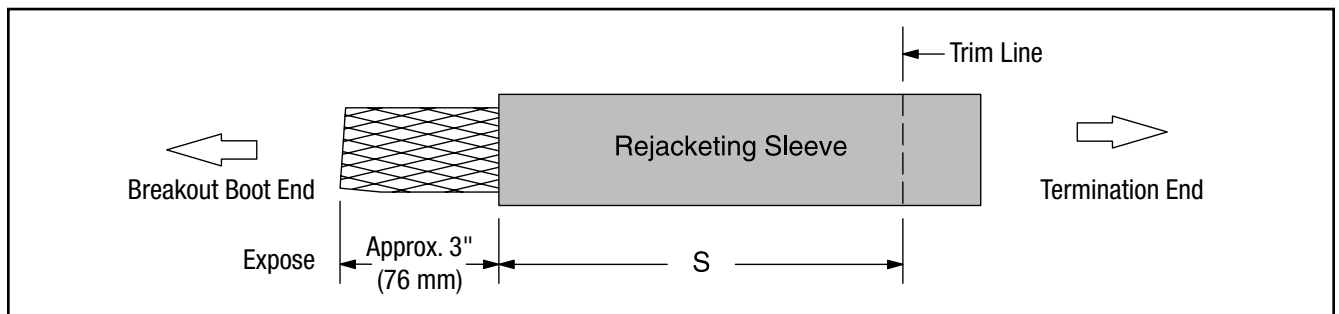


Figure 13

- 5.5 Guide one rejacketing sleeve assembly over each cable phase leg (*Figure 14*). **Push sleeve assembly from above. Continuously guide the free end maintaining sleeve-to-cable-core alignment.**

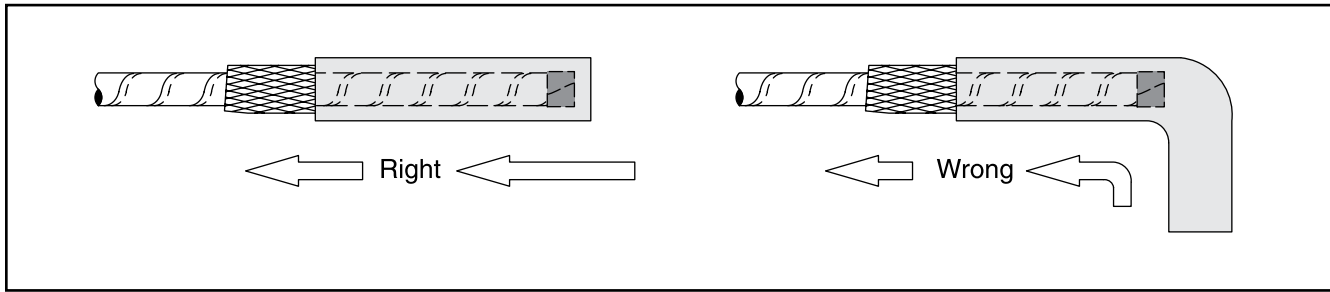


Figure 14

- 5.6 Slide rejacketing sleeve until inner polyester braid is adjacent to breakout boot finger (*Figure 15*)

- 5.7 Fold outer silicone tubing back on itself for 1" (25 mm) (*Figure 15*) and trim off exposed polyester braid.

**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.**

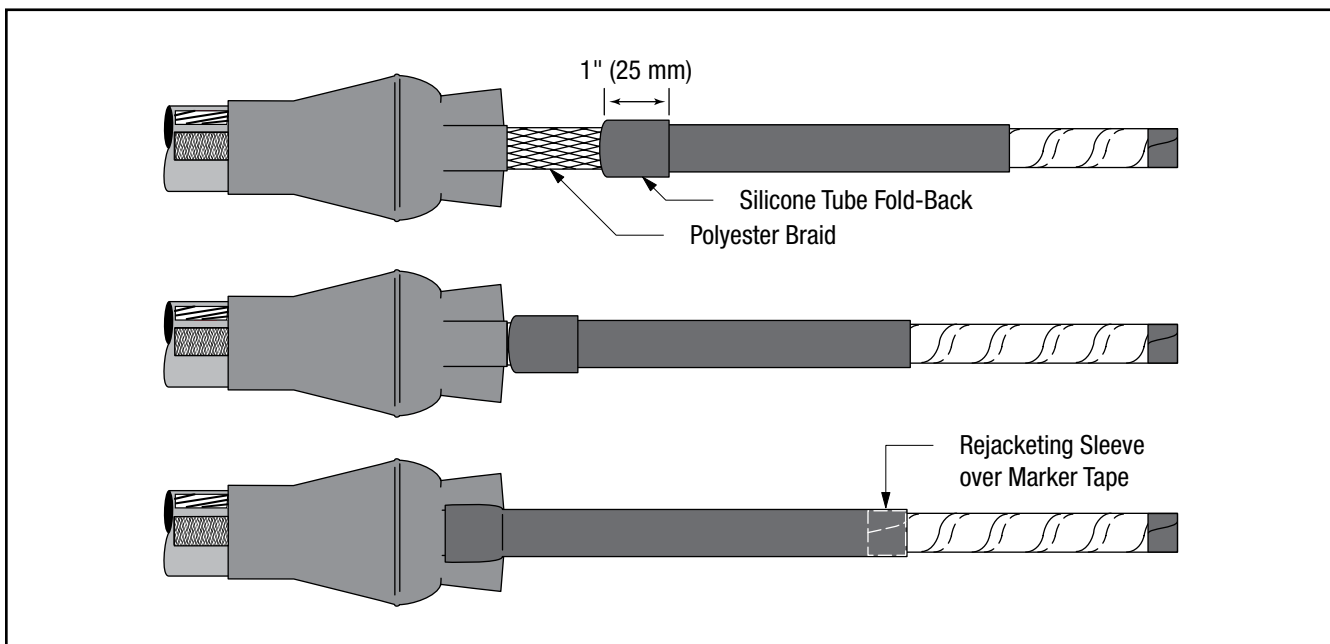


Figure 15

- 5.8 Slide rejacketing sleeve assembly down until folded tube contacts edge of breakout boot finger (*Figure 15*).

- 5.9 Pull folded silicone tube section down onto breakout boot finger (*Figure 15*).

**Note: Rejacketing tube end should align with upper edge of installed marker tape (*Figure 15*). Minor tube adjustments can be made as needed.**

## 6.0 Prepare Cable Phase Legs

- 6.1 Refer to the accessory cable preparation section of the appropriate Single Conductor Accessory Kit Instruction Sheet for cable phase leg dimensions.
- 6.2 Secure rejacketing sleeve with two half-lapped layers of Scotch® Super 33+™ Vinyl Electrical Tape (*Figure 16*). Start taping 0.75" (19 mm) over rejacketing sleeve, extend 0.25" (6 mm) **MAXIMUM** over cable metallic shield and return to starting point.

***NOTE: Do not fully cover the Copper Tape Shield or 3M™ Copper Foil Shielding Tape 1181 Strips. BE SURE TO LEAVE PART OF THE COPPER TAPE SHIELD EXPOSED.***

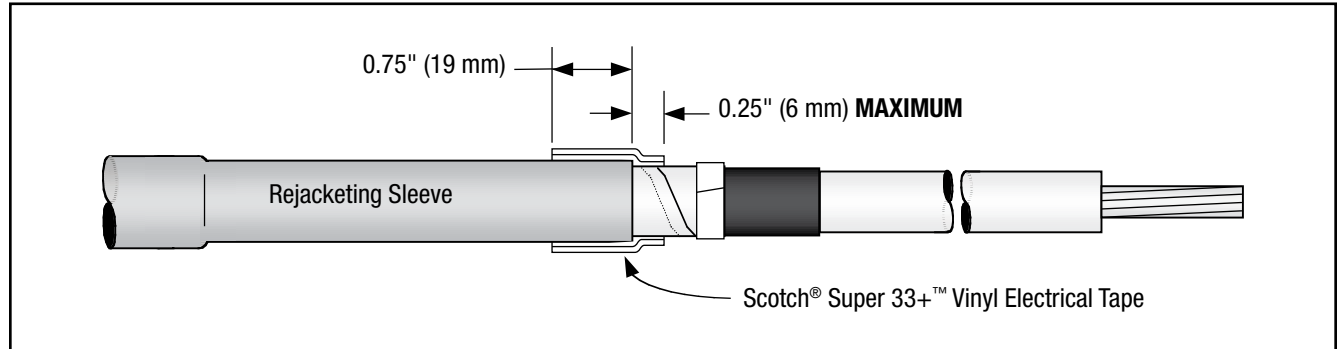


Figure 16

- 6.3 **FROM THIS POINT ON, FOLLOW THE SINGLE CONDUCTOR ACCESSORY INSTRUCTIONS.**

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