



# Industrial Loadbreak Elbow

200 A

25 kV Class

## 5811 Series

### Installation Instructions

#### 1.0 General

The 3M™ Industrial Loadbreak Elbow connector is a fully-shielded and insulated plug-in termination for connecting underground cable to transformers, switching cabinets and junctions equipped with loadbreak bushings. The elbow connector and bushing insert comprise the essential components of all loadbreak connections.

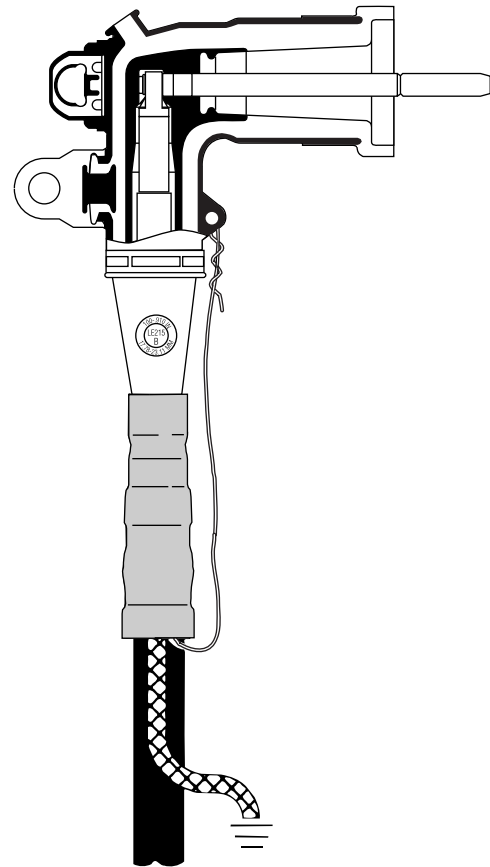
The coppertop (bimetal) compression connector is a standard item to transition from the cable to the loadbreak probe. An aluminum crimp barrel is inertia-welded to a copper lug. The aluminum barrel makes the connector easy to crimp and the copper lug ensures a reliable, tight, cool operating connection with the loadbreak probe.

#### 2.0 Installation

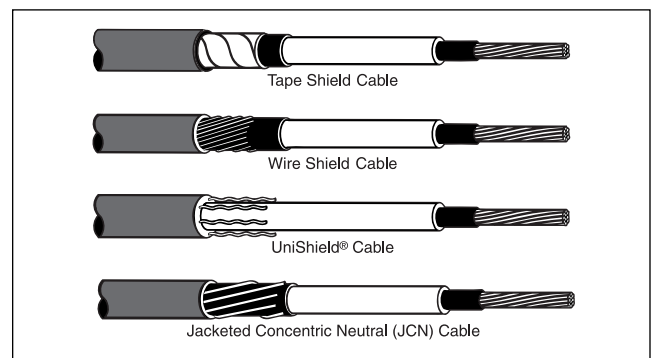
Cable stripping and scoring tools, available from various tool manufacturers, are recommended for use when installing loadbreak elbows. After preparing the cable and installing shield adapter, the elbow housing is pushed onto the cable. The loadbreak probe is threaded into the coppertop connector using the supplied installation tool or an approved equivalent. Use a shotgun stick to perform loadmake and loadbreak operations. (See page 10 for operating instructions.)

#### Kit Contents:

- Elbow Body
- Coppertop Compression Connector
- Loadbreak Probe
- Probe Installation Tool
- Silicone Lubricant
- Cold Shrink Jacketing Tube
- Mastic Strips (3 ea.)
- Ground Braid Assembly
- Constant Force Spring
- CC-3 Cable Cleaning Pads
- Installation Instructions



**Figure 1.** Illustration of a completely assembled 25 kV loadbreak elbow, shown on tape shielded cable.



**Installation Notes:**

• Cable description (check kit selection table on page 3) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

• Crimping Tool (check crimp chart on page 9) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

• Location \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

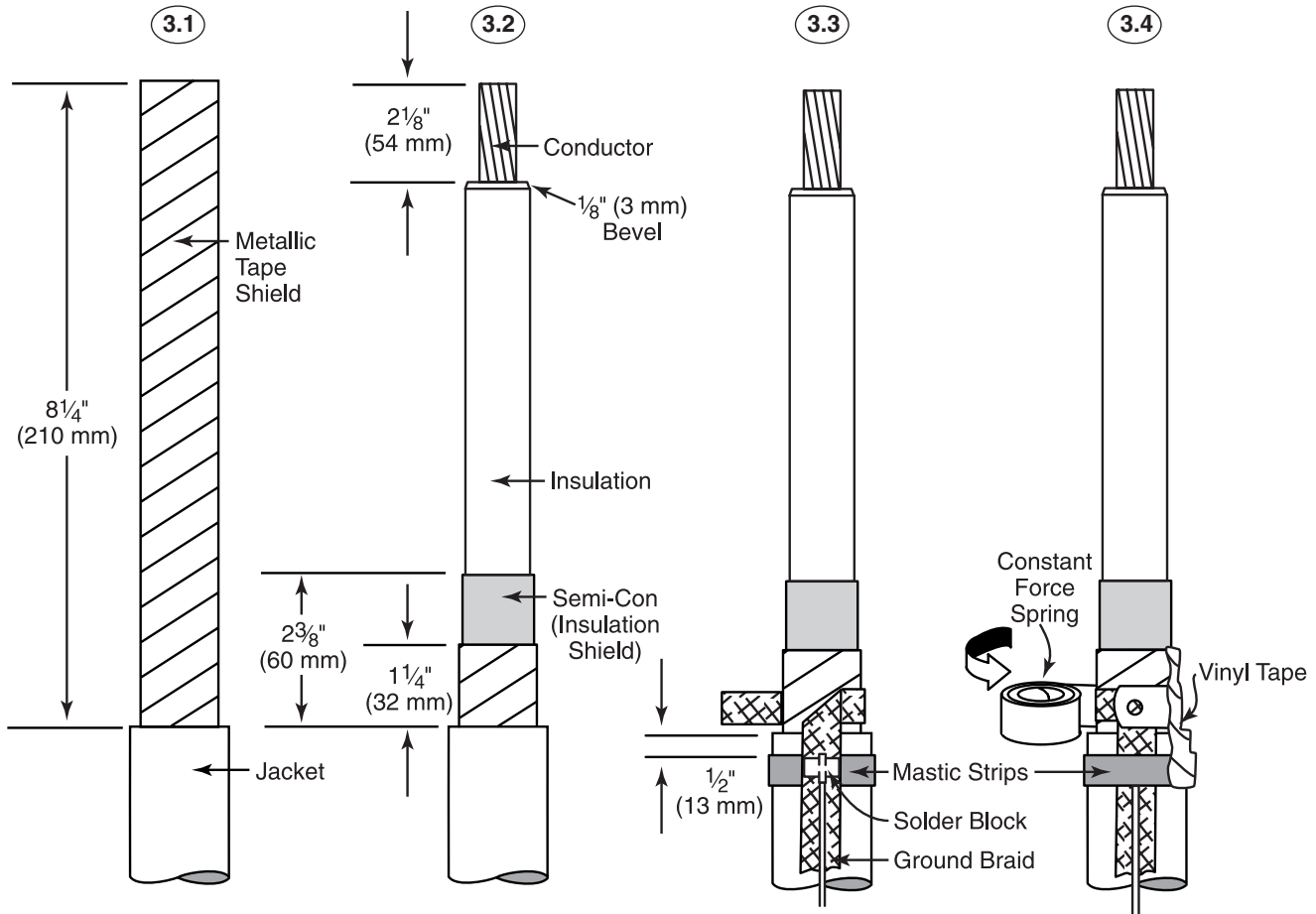
• Installation comments \_\_\_\_\_  
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Table 1. Kit Selection Table for 25 kV Class

Kit No.	Insulation Diameter Range  Inches (mm)	25kV (AWG/kcmil)			
		100% (260 mils)		133% (320 mils)	
		Stranded	Compact/Solid	Stranded	Compact/Solid
5811-B*	0.700–0.910 (17.8–23.1)	2	2–1		
5811-B-3			2		
5811-B-2		2	1		
5811-C*	0.850–1.100 (21.6–27.9)	1–3/0	1/0–4/0	2–1/0	2–1/0
5811-C-3					2
5811-C-2				2	1
5811-C-1		1	1/0	1	1/0
5811-C-1/0		1/0	2/0	1/0	
5811-C-2/0		2/0	3/0		
5811-C-3/0		3/0	4/0		
5811-D*		1.040–1.250 (26.4–31.8)	4/0–250	250	2/0–4/0
5811-D-1/0					2/0
5811-D-2/0				2/0	3/0
5811-D-3/0				3/0	4/0
5811-D-4/0	4/0		250	4/0	
5811-D-250	250				

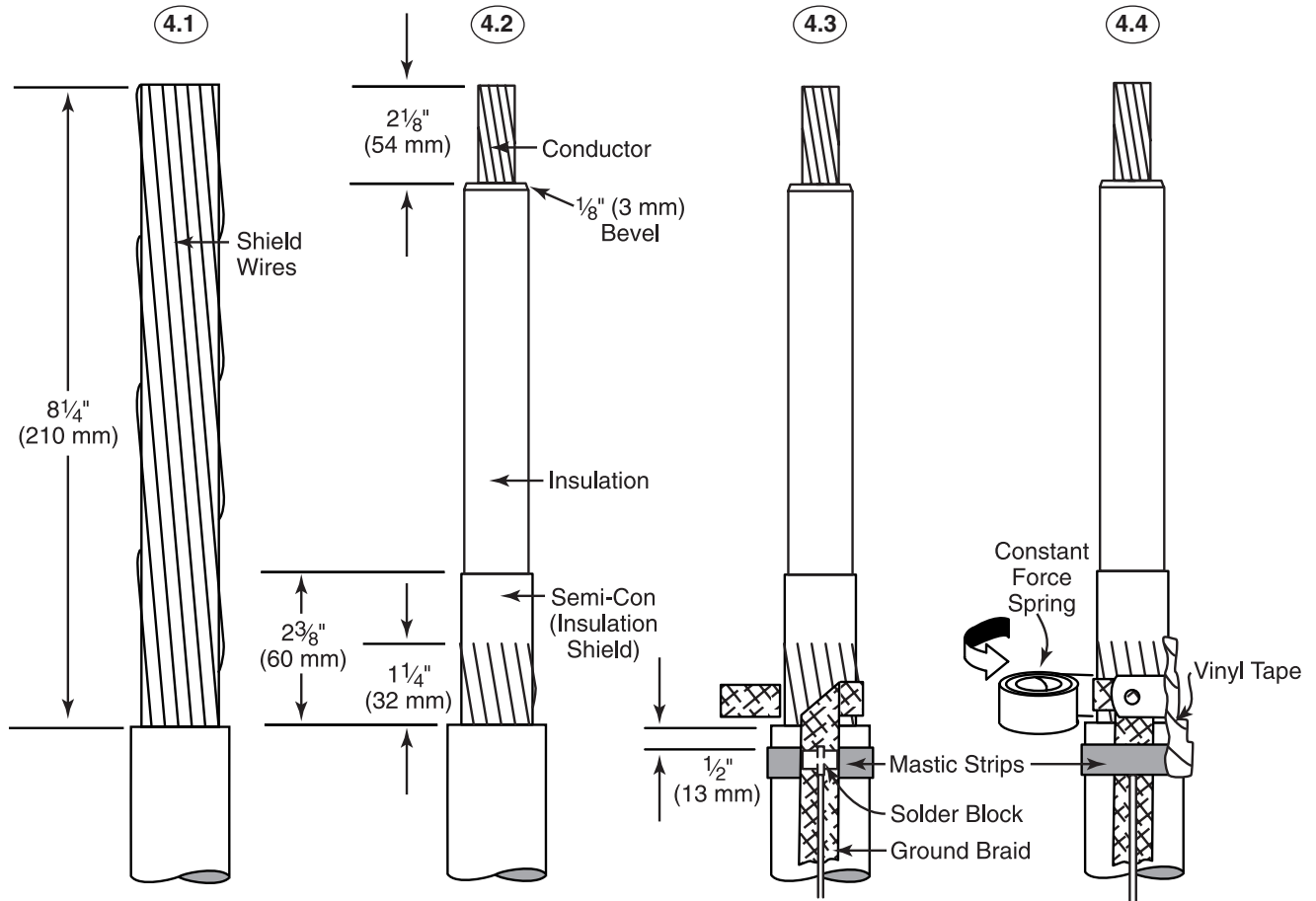
\*Kit without compression connector.

### 3.0 Preparation of Tape Shield Cable



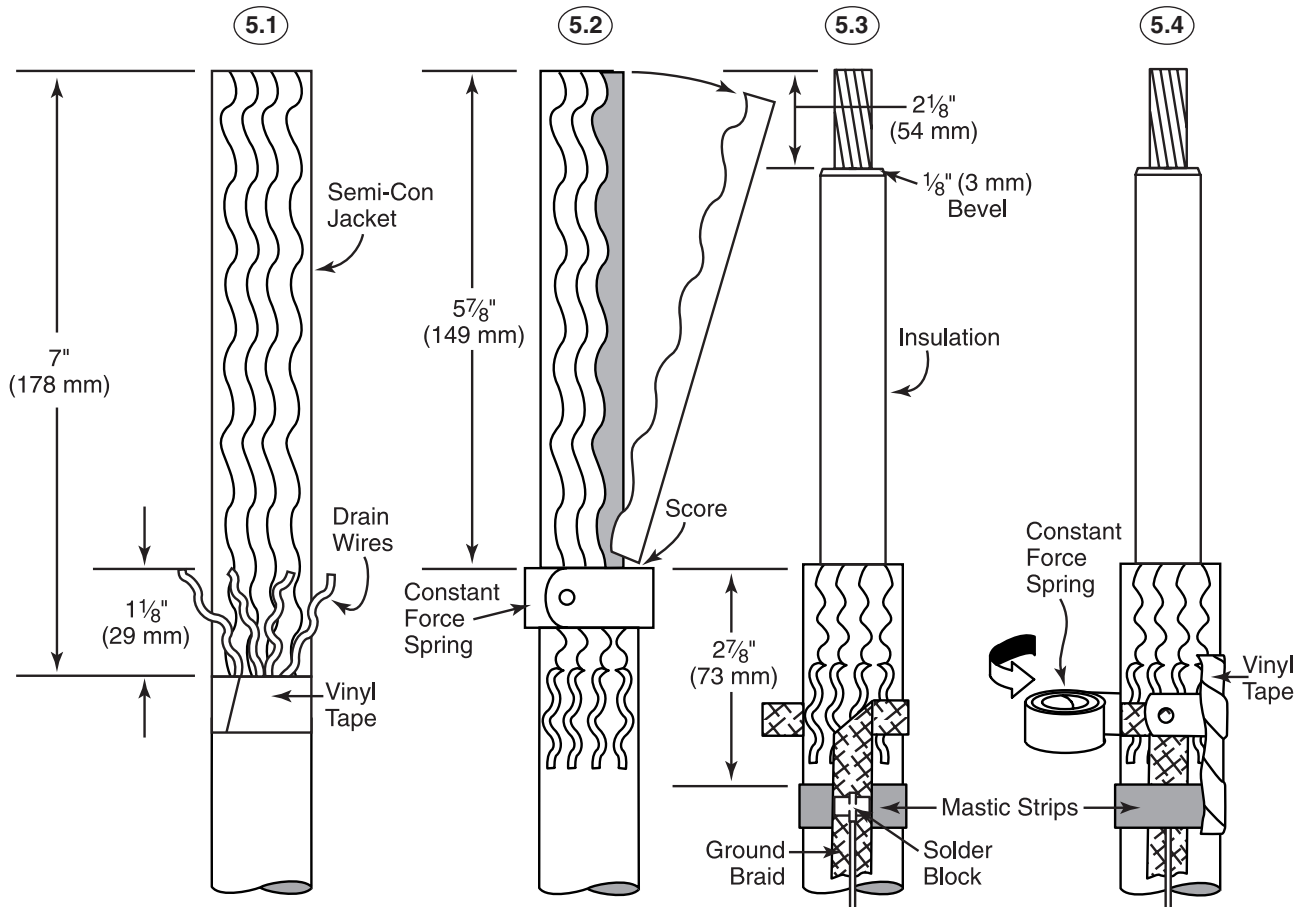
- 3.1 Check to be sure cable size fits within the kit range as shown in Table 1, page 3.
- Remove cable jacket for  $8\frac{1}{4}$ " (210 mm).
- 3.2 Remove metallic tape shield, leaving  $1\frac{1}{4}$ " (32 mm) exposed beyond cable jacket. (If necessary to prevent the tape shield from unwinding, temporarily hold down end of shield with a wrap of vinyl electrical tape.)
- Remove semi-con (insulation shield), leaving  $2\frac{3}{8}$ " (60 mm) beyond cable jacket.
  - Remove cable insulation for  $2\frac{1}{8}$ " (54 mm).
  - Place a  $\frac{1}{8}$ " (3 mm) bevel on end of cable insulation, to ease installation.
- 3.3 Remove white liners from one mastic strip and apply one wrap around cable jacket  $\frac{1}{2}$ " (13 mm) from edge. Apply with light tension. Cut off excess mastic.
- Position preformed ground braid with long leg along cable jacket as shown, with braid solder block centered on previously applied mastic strip.
  - Wrap short leg of ground braid around cable metallic tape shield for one complete wrap. Trim excess to eliminate overlap. (Remove temporary wrap of vinyl tape if applicable.)
- 3.4 Secure ground braid to metallic tape shield with constant force spring. Wrap spring in same direction as ground braid, as shown. Cinch (tighten) the last wrap of spring.
- Remove liners from second mastic strip and apply one wrap over solder block and previously applied mastic strip. Cut off excess mastic.
  - Apply two half-lapped layers of vinyl tape over mastic, constant force spring and exposed tape shield.

## 4.0 Preparation of Wire Shield Cable



- 4.1 Check to be sure cable size fits within the kit range as shown in Table 1, page 3.
  - Remove cable jacket for 8 $\frac{1}{4}$ " (210 mm).
- 4.2 Cut-off shield wires, leaving 1 $\frac{1}{4}$ " (32 mm) exposed beyond cable jacket.
  - Remove semi-con (insulation shield), leaving 2 $\frac{3}{8}$ " (60 mm) beyond cable jacket.
  - Remove cable insulation for 2 $\frac{1}{8}$ " (54 mm).
  - Place a  $\frac{1}{8}$ " (3 mm) bevel on end of cable insulation, to ease installation.
- 4.3 Remove white liners from one mastic strip and apply one wrap around cable jacket  $\frac{1}{2}$ " (13 mm) from edge. Apply with light tension. Cut off excess mastic.
  - Position preformed ground braid with long leg along cable jacket as shown, with braid solder block centered on previously applied mastic strip.
  - Wrap short leg of ground braid around cable wire shield for one complete wrap. Trim excess to eliminate overlap.
- 4.4 Secure ground braid to wire shield with constant force spring. Wrap spring in same direction as ground braid, as shown. Cinch (tighten) the last wrap of spring.
  - Remove liners from second mastic strip and apply one wrap over solder block and previously applied mastic strip. Cut off excess mastic.
  - Apply two half-lapped layers of vinyl tape over mastic, constant force spring and exposed wire shield.

## 5.0 Preparation of UniShield® Cable

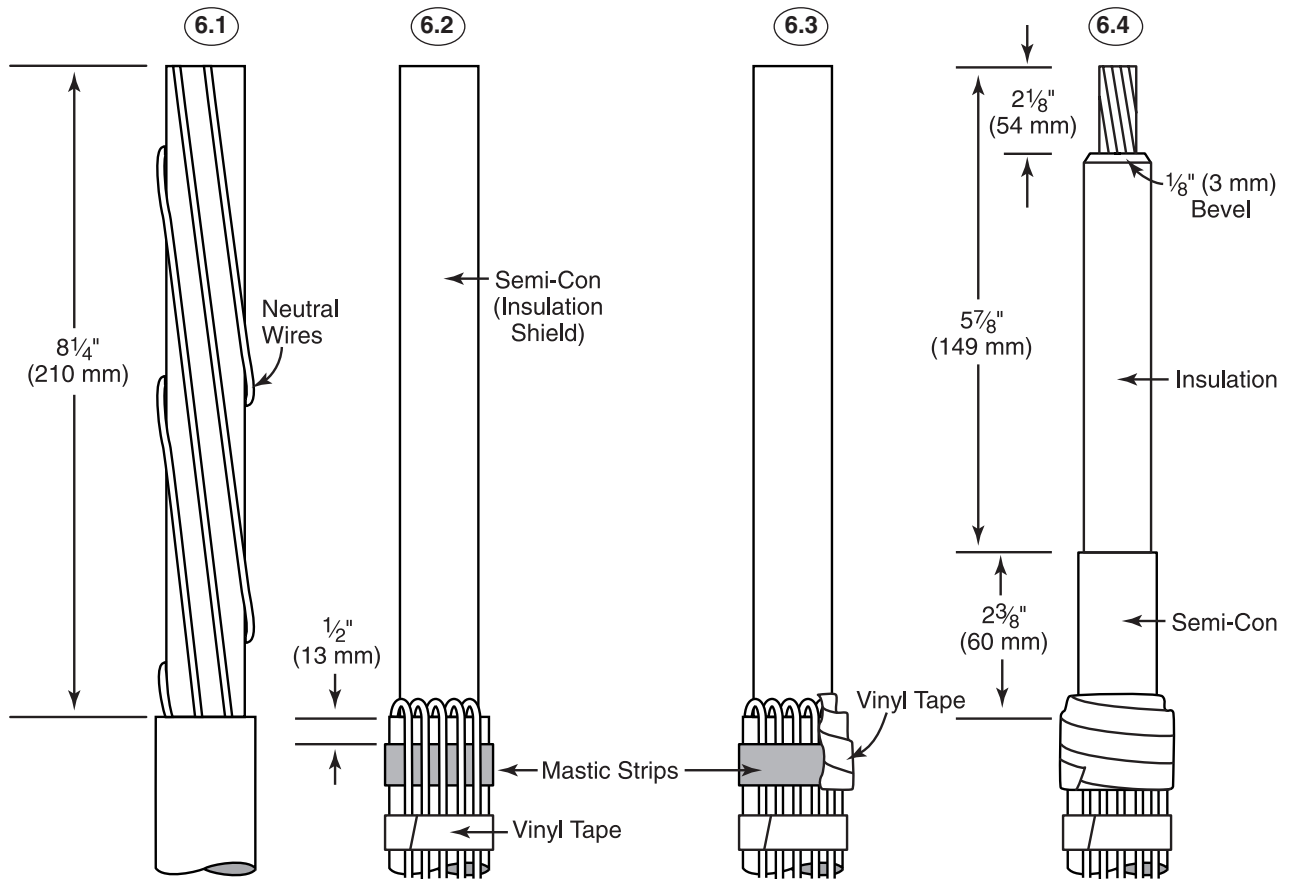


5.1 Check to be sure cable size fits within the kit range as shown in Table 1, page 3.

**Note:** *UniShield cable has compact conductor.*

- Mark cable jacket 7" (178 mm) from cable end (a temporary wrap of vinyl tape can be used as a marker).
  - Use a needle-nose pliers to pull each individual drain wire out through cable semi-con jacket, back to previously applied mark. (Remove vinyl tape if it was used as a temporary marker.) Cut off wires leaving 1 1/8" (29 mm) exposed. Carefully bend drain wires back along cable jacket. Keep wires separated and spaced around cable.
- 5.2 Temporarily install constant force spring over cable semi-con jacket, 5 7/8" (149 mm) from cable end.
- Score semi-con jacket (cut 80% through) at edge of spring. Remove jacket sections by carefully pulling against spring. Use care not to lift (bell) the end of the jacket.
  - Remove constant force spring (save spring for later ground installation.)
- 5.3 Remove cable insulation for 2 1/8" (54 mm) from edge.
- Place a 1/8" (3 mm) bevel on the end of cable insulation to ease installation.
  - Remove white liners from one mastic strip and apply one wrap around cable semi-con jacket 2 7/8" (73 mm) from edge. Apply with light tension. Cut off excess mastic.
  - Position preformed braid with long leg along cable jacket as shown, with braid solder block centered on previously applied mastic strip.
  - Wrap short leg of ground braid around bent back drain wires for 1 complete wrap. Trim excess to eliminate overlap.
- 5.4 Secure ground braid to drain wires with constant force spring. Wrap spring in same direction as ground braid, as shown. Cinch (tighten) the last wrap of spring.
- Remove liners from 2nd mastic strip and apply 1 wrap over solder block and previously applied mastic strip. Cut off excess mastic.
  - Apply 2 half-lapped layers of vinyl tape over mastic, constant force spring and exposed drain wires.

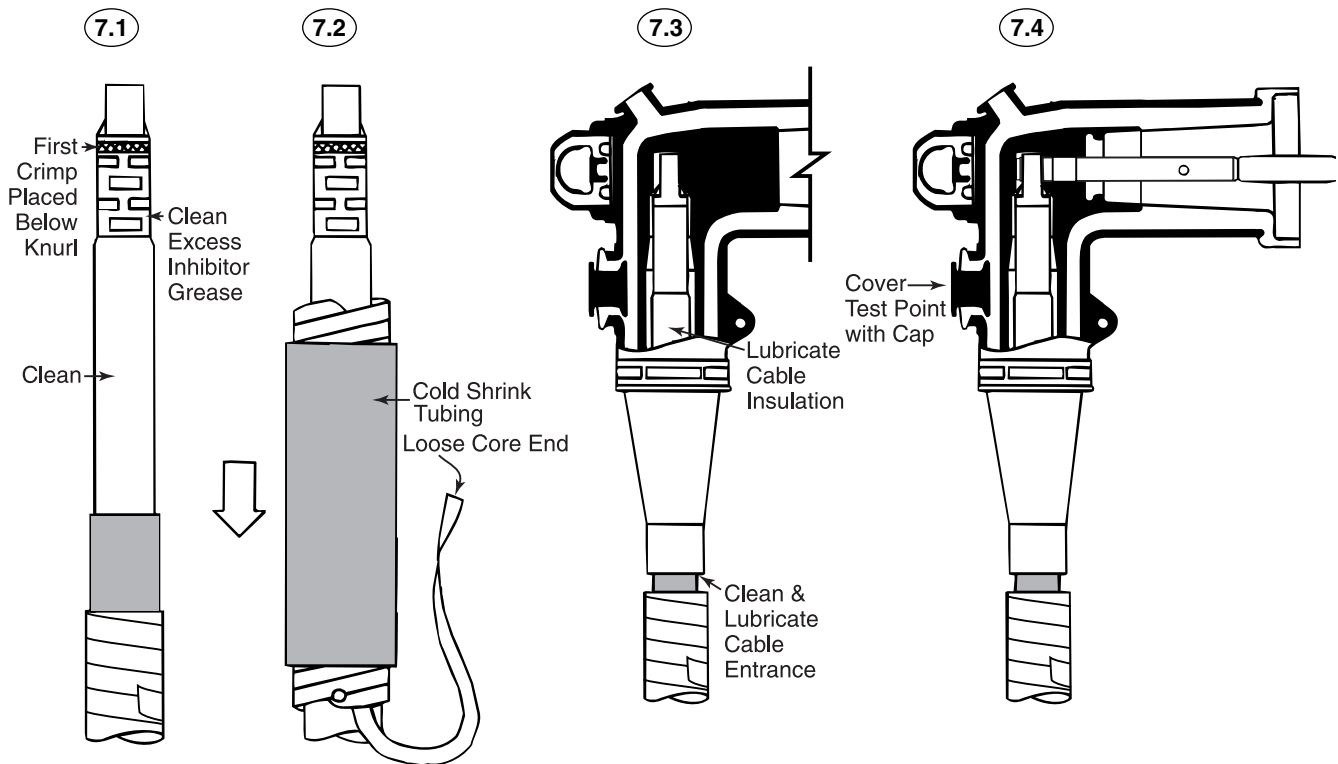
## 6.0 Preparation of Jacketed Concentric Neutral Cable



**Note:** The ground braid assembly and constant force spring are not used for this application.

- 6.1 Check to be sure cable size fits within the kit range as shown in Table 1, page 3.
  - Remove cable jacket for  $8\frac{1}{4}$ " (210 mm).
- 6.2 Remove white liners from 1 mastic strip and apply 1 wrap around cable jacket  $\frac{1}{2}$ " (13 mm) from edge. Apply with light tension. Cut off excess mastic.
  - Bend neutral wires back over mastic strip and secure to cable jacket 2" (51 mm) from jacket end. Keep wires separated and spaced around cable.
- 6.3 Remove white liners from 2nd mastic strip and apply 1 wrap over neutral wires and previously applied mastic strip.
  - Press neutral wires into mastic by applying 2 highly stretched half-lapped layers of vinyl tape over mastic and bent-back neutral wires.
- 6.4 Continue cable preparation.
  - Remove semi-con (insulation shield) for  $5\frac{7}{8}$ " (149 mm), leaving  $2\frac{3}{8}$ " (60 mm) exposed beyond cable jacket.
  - Remove cable insulation for  $2\frac{1}{8}$ " (54 mm).
  - Place a  $\frac{1}{8}$ " (3 mm) bevel on end of cable insulation to ease installation.

## 7.0 Elbow and Loadbreak Probe Installation



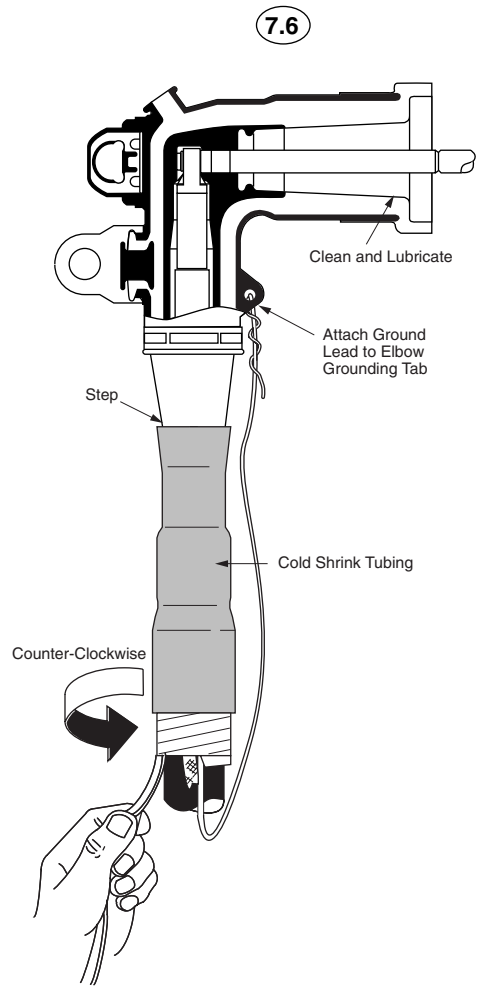
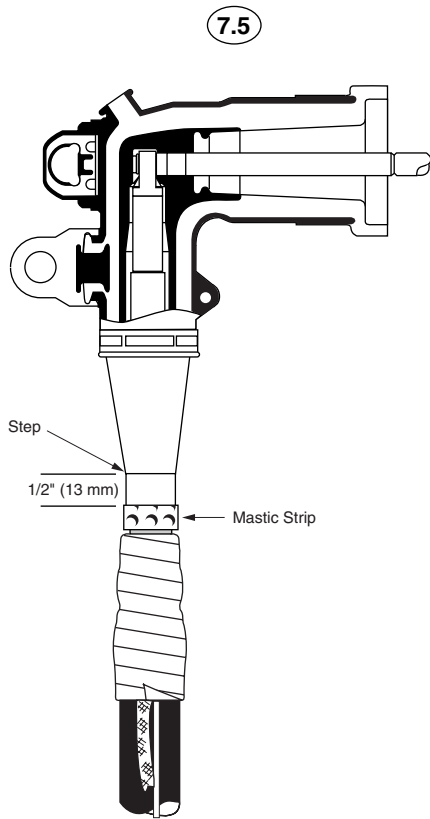
- 7.1 Clean the exposed conductor using a wire brush. Place the coppertop (bimetal) connector on the conductor. Make sure threaded hole in connector faces the apparatus bushing. Crimp the connector in place using a tool and die combination listed in Table 2. Start crimping just below the knurled line and rotate each successive crimp to prevent bowing. Do not overlap crimps. Place as many crimps on the connector as will fit.
- Clean excess inhibitor grease from coppertop connector by wiping toward threaded eye.
  - Clean cable insulation with solvent pad(s) from 3M CC-3 Cable Cleaning Kit. Do Not allow solvent to touch cable semi-con.

**Note:** *If use of an abrasive cloth is necessary, use an electrical grade (non-conductive) abrasive. A 120 grit abrasive is recommended.*

- 7.2 Slide Cold Shrink assembly over cable with loose core end leading (away from cable end). Temporarily position it just beyond prepared cable end.
- 7.3 Apply a thin coating of silicone lubricant to the cable insulation.
- Clean and lubricate the cable entrance of the elbow.
  - Place elbow on cable. With a twisting motion, push elbow onto cable until threaded eye of coppertop connector is aligned with the elbow.
- 7.4 By hand, thread loadbreak probe into threaded eye of coppertop connector. When tight, use the provided installation tool to properly torque the loadbreak probe. Proper torque is applied when the tool achieves a 180° permanent set.

**Note:** *If a different installation tool is used it must apply a torque of 110 in-lbs to achieve proper installation.*





- 7.5 Remove white liners from remaining mastic strip and apply around base of elbow, 1/2" (13 mm) from step as shown. Apply 1 layer of vinyl tape over mastic.
- 7.6 Align Cold Shrink rubber tube (not core) with step of elbow. Remove core by pulling and unwinding the core counter-clockwise.
- Attach 14 AWG ground lead (from ground braid assembly) to the elbow grounding eye. Connect ground braid to system ground. (For jacketed

concentric neutral cable, attach a neutral strand to grounding eye, and connect remaining neutral bundle to system ground.)

**Table 2.**  
Crimp Chart.

Connector		5/8" Diameter					3/4" Diameter			
Conductor Size		4 AWG through 2/0 Stranded					3/0 AWG through 250 kcmil Stranded			
<b>Burndy</b>	Tool	Y34	Y35 OR Y39		MD6		Y34	Y35 OR Y39		MD6
	Die	A243	U243	UBG	W243	WBG	U247	U247	U467	W247
		A25AR	U25ART	U687	BG Nose	W687	A27AR	U27ART		
<b>Thomas &amp; Betts</b>	Tool	UT-3		UT-5	UT-15		UT-5		UT-15	
	Die	5/8"		TV	54 H		TV		66	
<b>Kearney</b>	Tool	0		H-1, H-2		0		H-1, H-2		
	Die	5/8" Nose	9/16"	9/16"	572	737	747	737	747	
<b>Alcoa</b>	Tool	12A					12A			
	Die	B24 EA					B39 EA			
<b>Anderson Tool</b>		VC-5, VC-6					VC-5, VC-6			
<b>EEL—Reference</b>		8A					10A			

## 8.0 Operating Instructions

### 8.1 Before Loadmake or Loadbreak Operation:

Area must be clear of obstructions or contaminants that would interfere with the operation of the connector. This position should allow you to establish firm footing and enable you to grasp the shotgun stick securely, maintaining positive control over the movement of the loadbreak connector before, during and directly after the operating sequence. Because of the control, speed and force required to engage or disengage the elbow, certain operating positions are more advantageous than others. If there is some question as to proper operating position, it is recommended that the connectors be operated de-energized. Do not connect two different phases of a multiple-phase system. Before closing a single-phase loop, make certain both ends of the loop are the same phase.

### 8.2 Loadmake Operation

- Area must be clear of obstructions or contaminants that would interfere with the operation of the loadbreak elbow.
- Securely fasten a shotgun stick to the pulling eye.
- Place the loadbreak elbow over the bushing, inserting the loadbreak probe into the bushing until the first slight resistance is felt. Resistance is felt when the arc follower portion of the loadbreak probe first meets the female contact of the bushing.
- Immediately thrust the elbow onto the bushing with a fast, firm, straight motion, with sufficient force to latch the elbow to the bushing.

### 8.3 Fault Close


- It is not recommended that operations be made on known faults.
- If a fault is experienced, both the elbow connector and the bushing must be replaced.

### 8.4 Loadbreak Operation

- Securely fasten a shotgun stick to the pulling eye.
- Without exerting any pulling force, slightly rotate the connector clockwise in order to break surface friction between the elbow and bushing.
- Withdraw the connector from the bushing with a fast, firm, straight motion, being careful not to place the connector near a ground plane.
- Place connector on appropriate accessory device, following the operating instructions for that accessory.



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Note: The core material being removed from the Cold Shrink Tube is mixed polymers and can be recycled with other waste. 

#### IMPORTANT NOTICE

Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use.

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