

3M™ 200 Amp Loadbreak Connector System

For 15 kV 3/C SHD-GC Portable Cord Set

Instructions

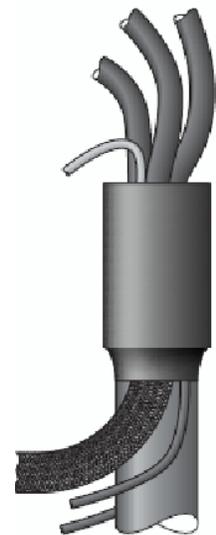
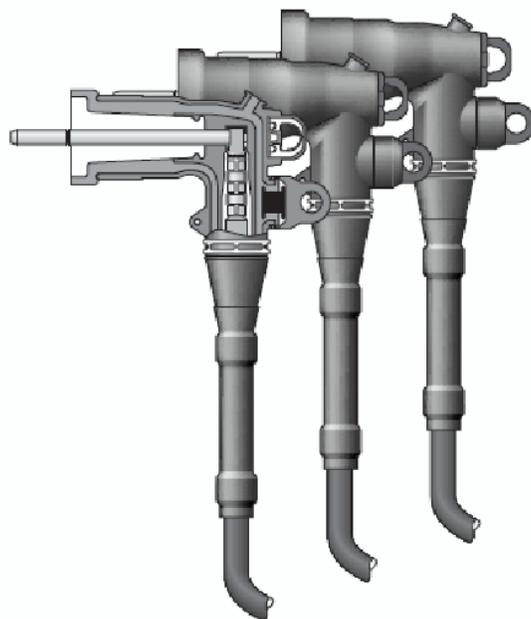
Technical Information:

- Cable Sizes: 2 AWG or 1 AWG Copper
- Loadbreak Elbow: 3M™ Loadbreak Elbow 5811-B, 25 kV* 200 Amp
- Conductor Rejacketing: 3M™ EPDM Cold Shrink Tubes
- Sheath Seal (Breakout): 3M™ Scotchcast™ Compound 2131

*25 kV rated for use in cold weather operations

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.



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**THESE INSTRUCTIONS REPLACE THOSE CONTAINED IN THE
INDIVIDUAL 3M™ ELBOW KITS 5811-B AND 3M SHEATH SEAL KIT 5831**

Kit Contents:

- 3 ea. Industrial Loadbreak Elbow Kit 5811-B
(NOTE: The Ground Braid Assembly is optional, and is not used with the standard installation.)
- 3 ea. Loadbreak Connector LBC-1 (for 2 AWG SHD-GC Cable)
- 3 ea. Loadbreak Connector LBC-1/0 (for 1 AWG SHD-GC Cable)
- 1 ea. Sheath Seal Kit 5831
- 1 ea. 3M Scotchcast™ Compound 2131, Size C (Additional compound for 5831)
- 1 ea. Spacer Web Strip, 1.5" W x 15" L (Additional web for 5831 Installation)
- 3 ea. Semi-con Cold Shrink Tube (Identification marked as "SEMI-CON")
- 6 ea. Cold Shrink Jacketing Tube, 19" L
- 3 ea. Shield Sleeve
- 6 ea. Constant Force Spring
- 1 ea. 3-Conductor Ground Braid Assembly
- 2 ea. Green Heat Shrink Tubing, 3/8" x 4'
- 1 ea. Scotch® Super 33+™ Vinyl Electrical Tape

Not Included in Kit:

(To be provided by 3M, c/o area sales representative)

- 1 ea.* Tag, Blue
 - 1 ea.* Tag, Black
 - 1 ea.* Tag, Red
- } "THIS CONNECTION INTERNALLY GROUNDED"

These instructions do not claim to cover all details or variations in the equipment, procedure, or process described, nor to provide directions for meeting every contingency during installation, operation, or maintenance. When additional information is desired to satisfy a problem not covered sufficiently for the user's purpose, please contact your 3M sales representative.

1.0 Prepare Cable

- 1.1 Remove cable jacket for 40" (102 mm). (Figure 1)
- 1.2 Remove any bedding tape or cable fillers back to the cable jacket and discard.
- 1.3 Scuff end of cable jacket for 7" (178 mm). Scuff 2-1/2" (64 mm) of the ground check insulation, starting at cutback end of cable jacket. (*A thorough scuffing is important to assure a good bond with the sheath seal compound.*) (Figure 1.)

NOTE: The 3M™ Sheath Seal Kit 5831 contains a strip of abrasive cloth.

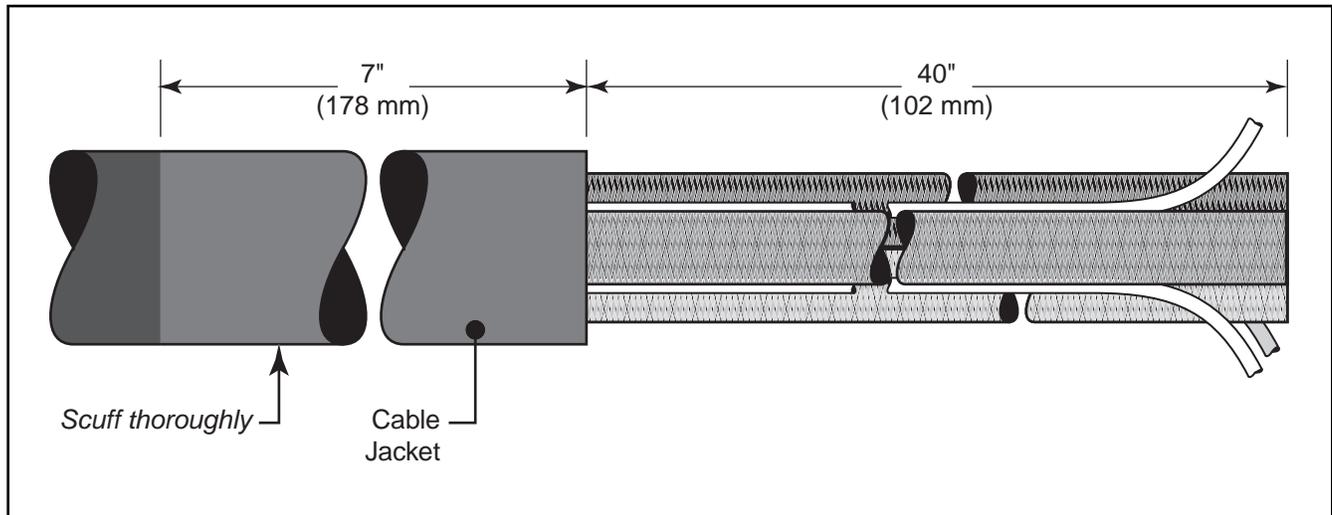


Figure 1

- 1.4 Apply 2 wraps of Scotch® Super 33+™ Vinyl Electrical Tape around each conductor, 7" (178 mm) from end. Remove metallic shielding to edge of Super 33+ Tape. (Figure 2.)

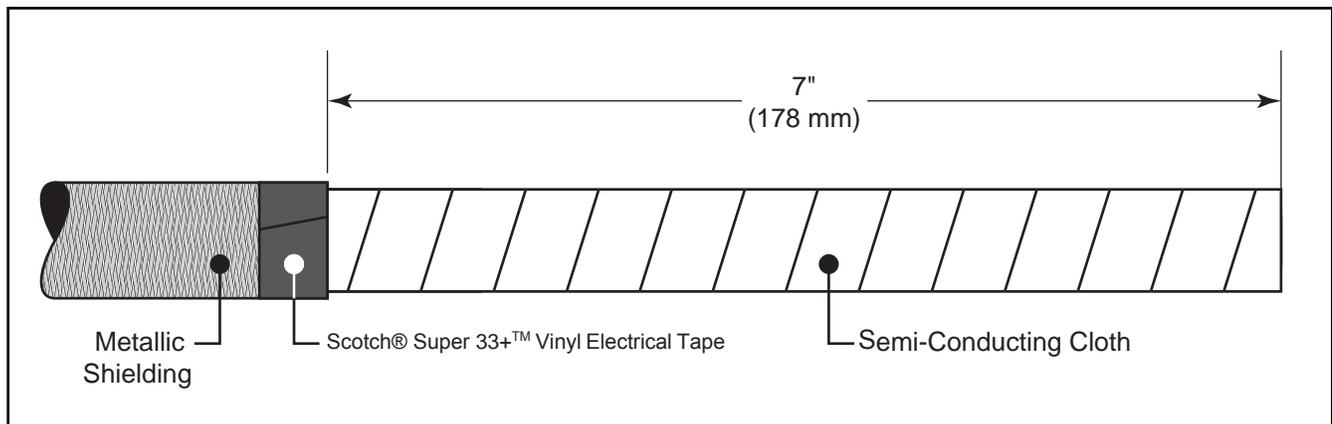


Figure 2

- 1.5 Remove semi-conducting cloth from each conductor, leaving 1-1/8" (29 mm) exposed beyond metallic shielding. (Figure 3.)
- 1.6 Remove insulation from each conductor for 2-1/8" (54 mm). (Figure 3.)
- 1.7 Trim off edge of insulation from each conductor to form a 1/8" (3 mm) bevel. (Figure 3.)

NOTE: Make a note identifying the conductor color-codes (for identification of phases after completion of the kit installation).

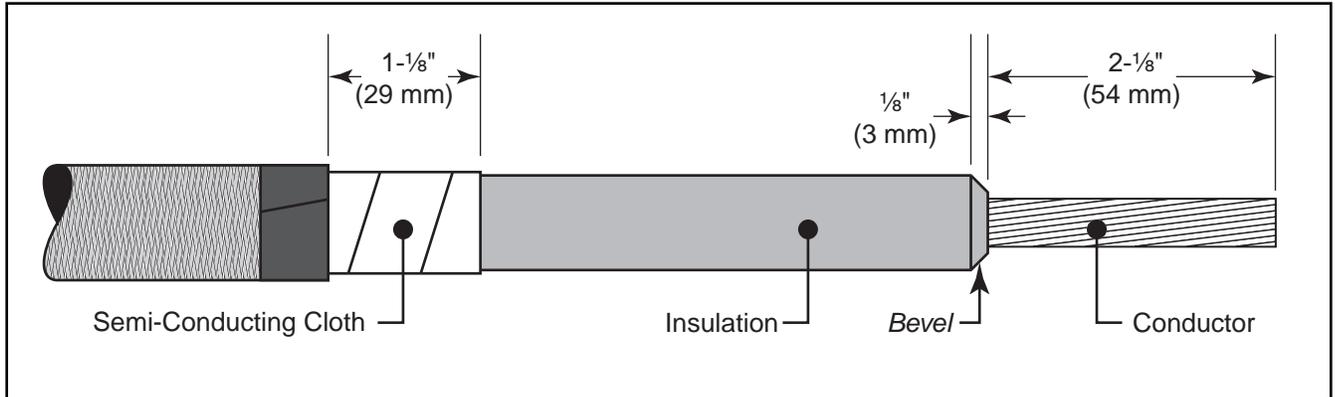


Figure 3

2.0 Install Phase Connectors

NOTE: This kit contains 6 3M™ Loadbreak Connectors, 3 ea. for 2 AWG and 1 AWG SHD-GC conductors. USE ONLY THE 3 PROPERLY SIZED CONNECTORS.

Table 1

Loadbreak connector No.	SHD-GC Conductor Size	Cable Qty.*
LBC-1	2 AWG	3
LBC-2	1 AWG	3

***NOTE: 3 of these connectors will not be used with this installation.**

- 2.1 Place LBC Connector on the conductor. Make sure that the threaded hole in the connector faces the desired direction. 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 the crimps. Place as many crimps on the connector as will fit. (Table 2 and Figure 4.)
- 2.2 Clean excess inhibitor grease from LBC connector by wiping toward threaded eye.
- 2.3 Repeat Steps 2.1 and 2.2 for other 2 conductors.

Table 2: Crimping Tool Die Set

TOOL	BURNDY					KEARNEY				ALCOA	ANDERSON
	Y34	Y35, Y39		MD6		O		H-1, H-2	12A	VC-5, VC-6	
DIE	A243	U243	UBG	W243	WBG	5/8" Nose	9/16"	9/16"	572	B24 EA	Universal
	A25AR	U25ART	U687	BG Nose	W687						

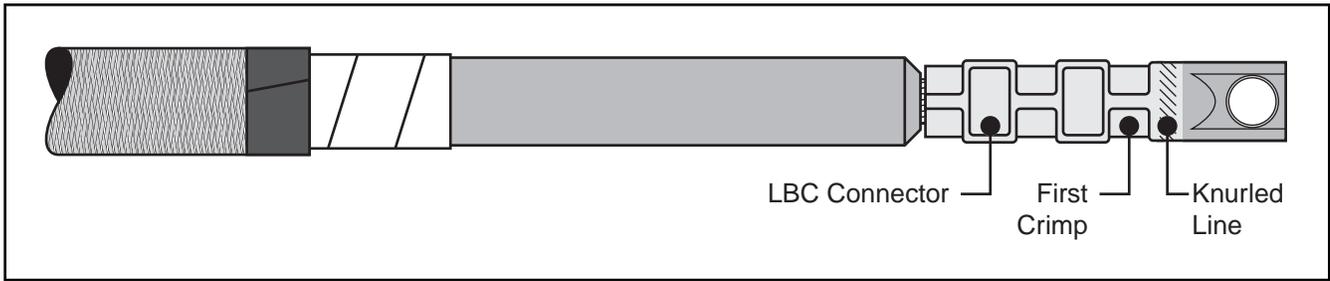


Figure 4

3.0 Install Semi-conducting Cold Shrink Tubes

3.1 Slide a semi-conducting cold shrink tube over each phase conductor with the loose core end leading (facing the cable breakout). (Figure 5.)

NOTE: *Semi-conducting tubes are marked with white printing, “SEMI-CON.”*

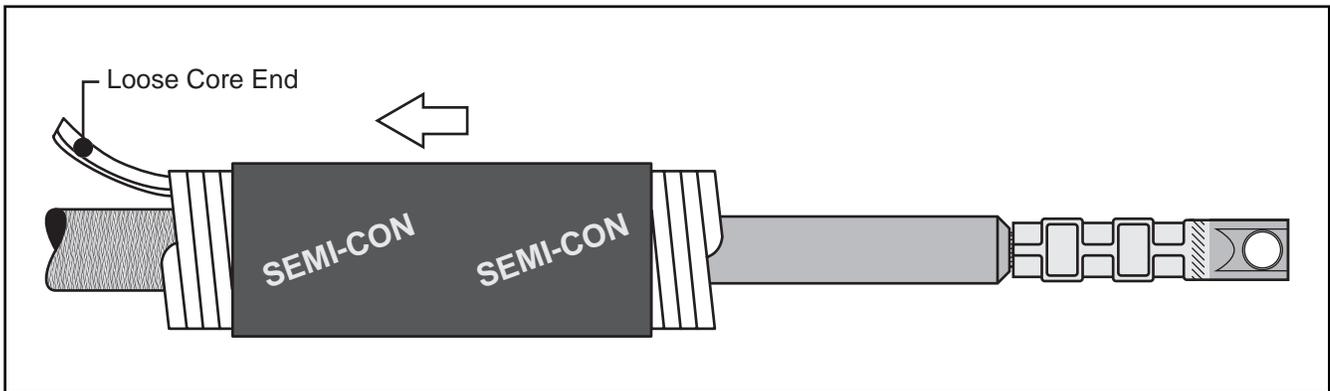


Figure 5

3.2 Align the leading edge of the semi-con tubes (not the cores) with the edge of cable semi-conducting cloth. Remove Cold Shrink core by UNWINDING COUNTER-CLOCKWISE. (Figure 6.)

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

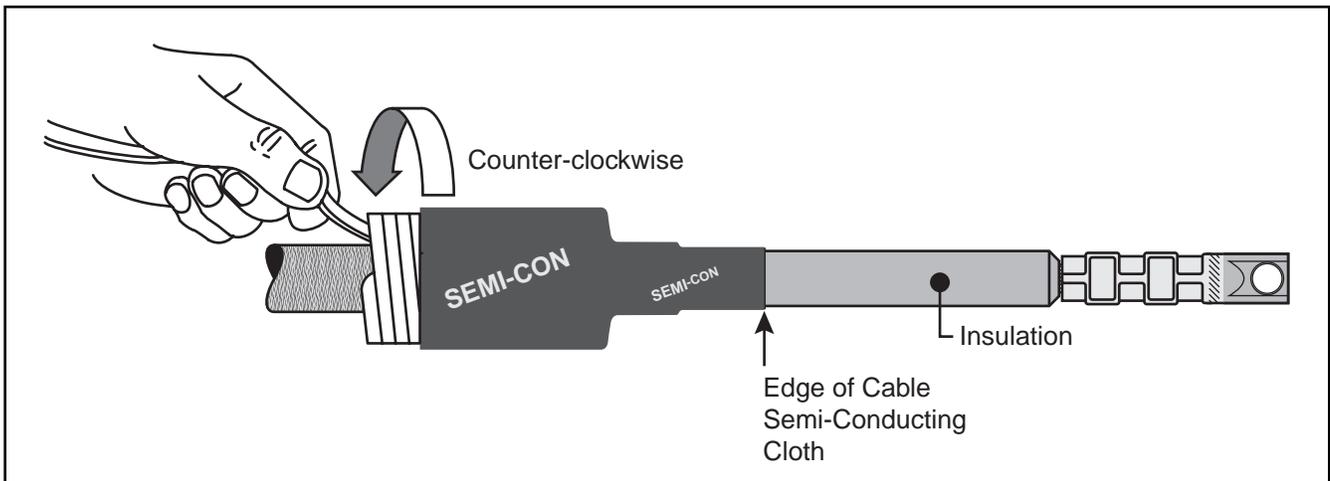


Figure 6

4.0 Prepare Ground Conductors

- 4.1 Slide green heat shrink tubing over the 2 bare ground wires, covering them up to the cable breakout. Shrink into place using an appropriate heat source (heat gun or heat shrink torch).

NOTE: Start shrinking at the cable breakout, and continue along wire to the cable end.

- 4.2 Install 3-Conductor Ground Braid Assembly: Position braid along cable jacket with the flat ground braid connector located 2-1/2" (64 mm) from edge of jacket, as shown. Temporarily secure braid to cable jacket with 1 or 2 wraps of Scotch® Super 33+™ Vinyl Electrical Tape. (Figure 7.)
- 4.3 Wrap short (center) braid leg around shielding of nearest phase conductor for one complete wrap. trim excess braid to eliminate overlap. (Figure 7.)

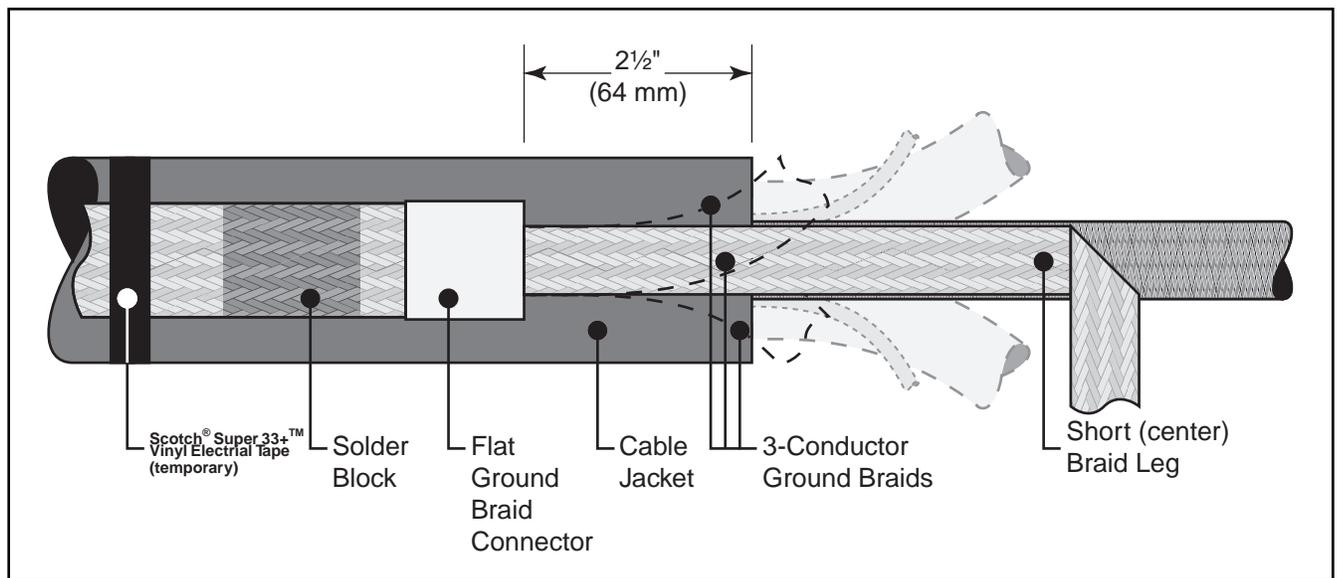


Figure 7

- 4.4 Attach ground braid legs to cable metallic shielding:
- Attach short (center) braid leg to the shielding using constant force spring, as shown. Wrap spring in the same direction as the ground braid. Cinch the last wrap of spring to tighten. (Figure 8.)
 - Apply 2 half-lapped layers of Super 33+ Tape over spring and adjacent 1/2" (13 mm) of cable shielding. (Figure 8.)
 - Repeat steps a. and b. for the 2 longer braid legs, connecting them to the shielding of the 2 remaining phase conductors.

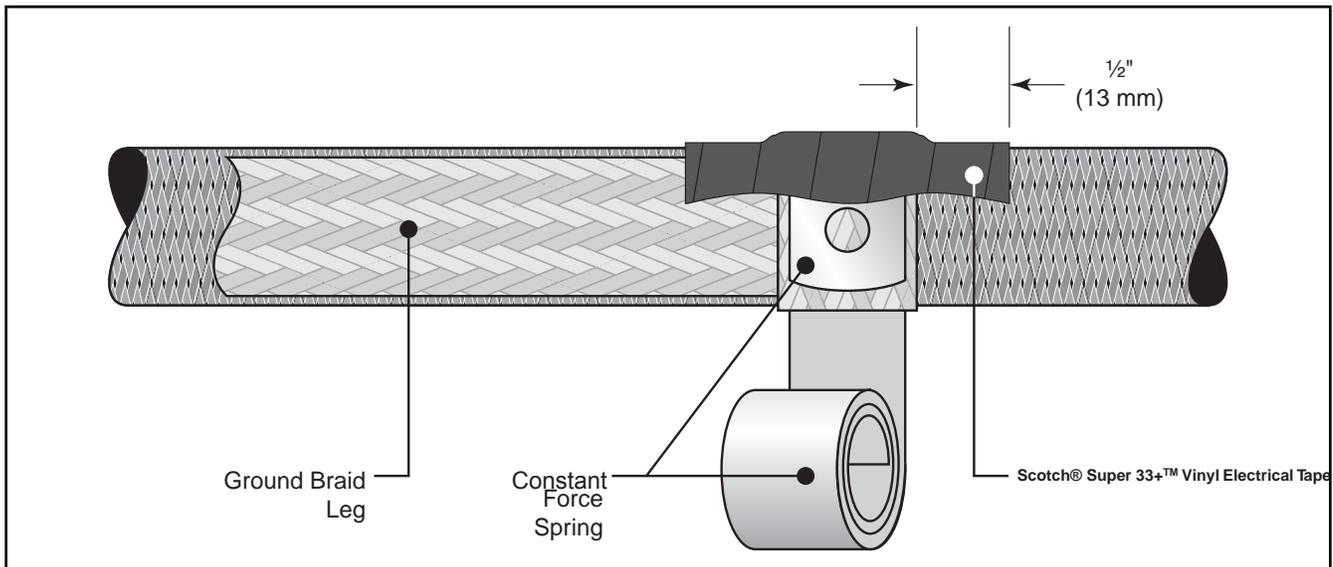


Figure 8

5.0 Cold Shrink Jacketing and Shield Sleeve

- 5.1 Slide a “long” cold shrink jacketing tube over each phase conductor and ground braid leg, with the loose core end trailing (facing connector end). (Figure 9.)

NOTE: This kit contains 6 “long” Jacketing Tubes. These are the longest cold shrink tubes provided in the kit; approximately 15–16” (380–406 mm) before installation.

- 5.2 Install jacketing tubes as close as possible to the cable breakout. Remove cold shrink cores by UNWINDING COUNTER-CLOCKWISE. (Figure 9.)

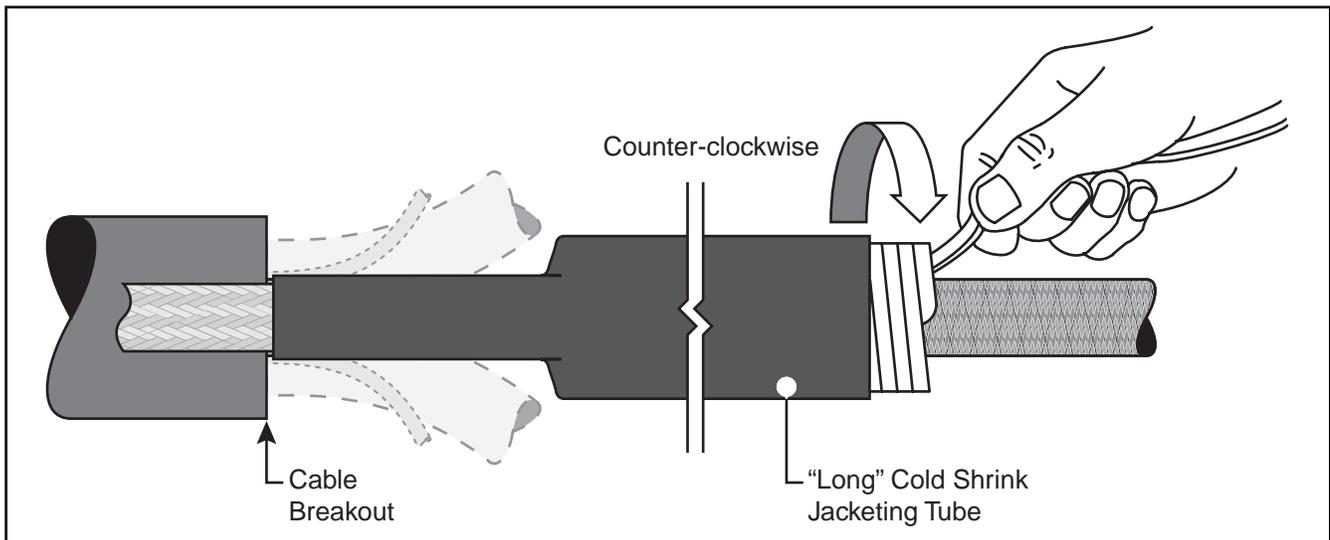


Figure 9

- 5.3 Slide a “short” cold shrink jacketing tube (packaged in 3M™ Loadbreak Kit 5811-B) over each phase conductor, with the loose core end leading (facing cable breakout). Temporarily park them over the 3 previously installed jacketing tubes. (Figure 10.)
- 5.4 Slide 3 remaining “long” Cold Shrink Jacketing Tubes over the phase conductors, with loose core ends leading (facing cable breakout). Temporarily park them over 3 previously installed Jacketing Tubes. (Figure 10.)

- 5.5 Expand shield sleeves and slide 1 onto each phase conductor. Temporarily park sleeves over cold shrink jacketing tubes. (Figure 10.)

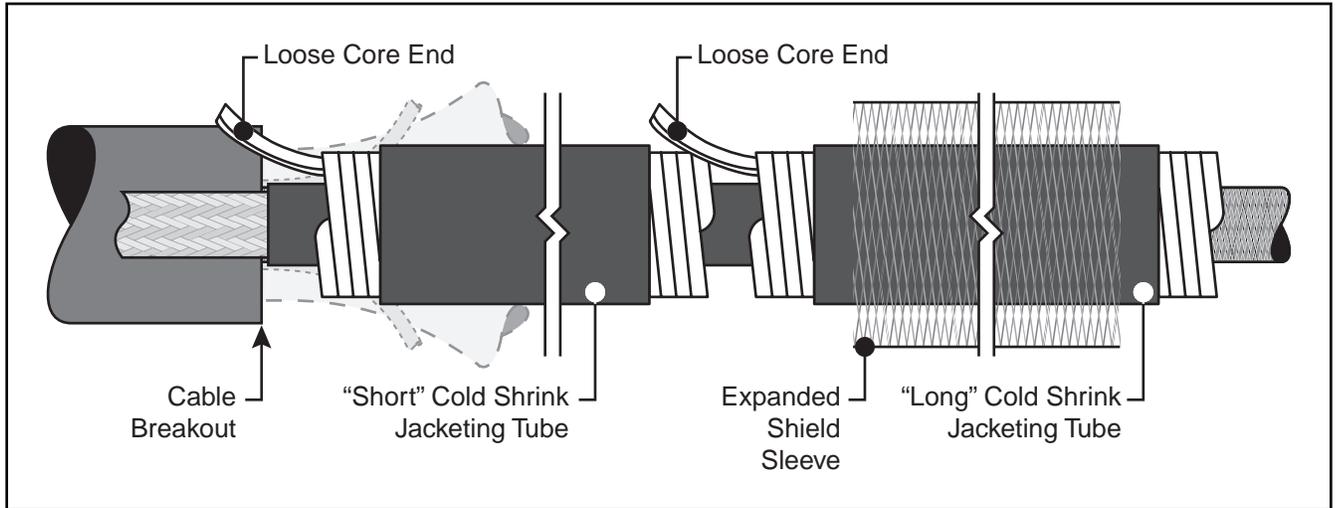


Figure 10

6.0 Install 3M™ Loadbreak Elbows 5811-B

- 6.1 Clean cable insulation with solvent pad(s) from 3M™ Cable Cleaning Kit CC-3. DO NOT allow solvent to touch cable semi-conducting cloth.

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

- 6.2 Apply a thin coating of silicone lubricant to the cable insulation. (Figure 11.)
- 6.3 Clean and lubricate the cable entrance. Install elbow with a twisting motion; push elbow onto cable until the threaded eye of the connector is aligned with the elbow. (Figure 11.)

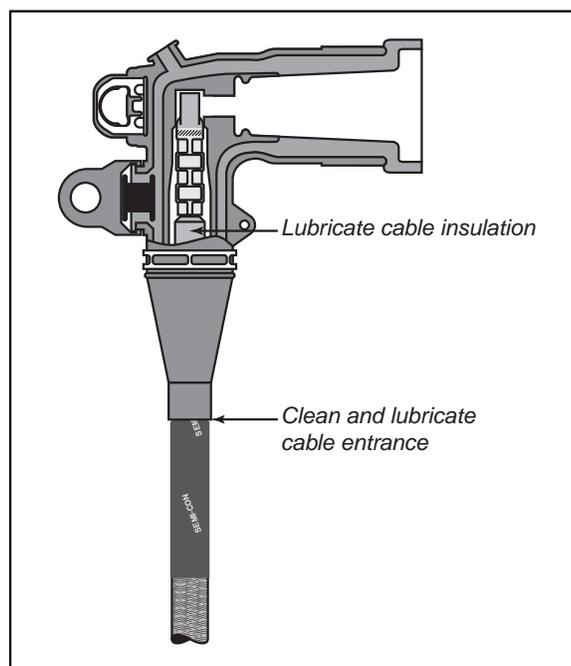


Figure 11

- 6.4 By hand, carefully thread loadbreak probe into threaded eye of connector. When tight, use the installation tool provided to properly torque the probe. Proper torque is applied when the tool achieves a 180° permanent set. (Figure 12.)

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

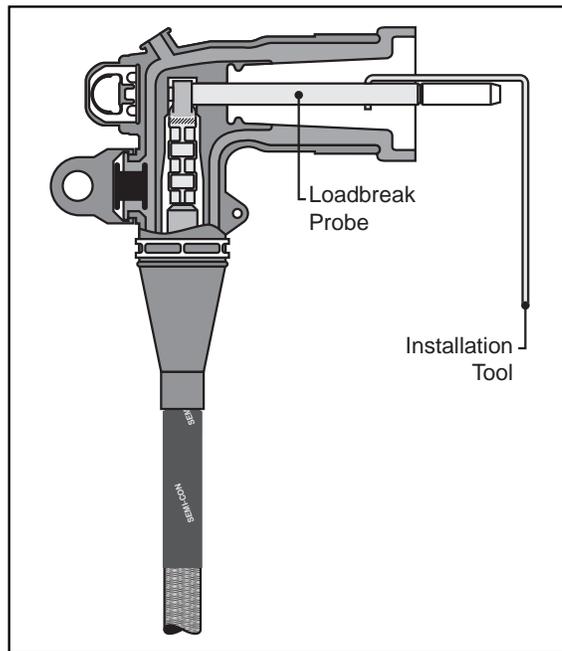


Figure 12

- 6.5 Repeat steps 6.1–6.4 for other 2 elbows.
- 6.6 Attach appropriate color-coded tag (black, blue or red), to grounding tab on each elbow. Tags identify each elbow as, “THIS CONNECTION INTERNALLY GROUNDED.”

NOTE: These tags are not included in the kit. They are to be provided by 3M area sales representative.

7.0 3M™ Loadbreak Elbow Grounding and Rejacketing

- 7.1 Slide expanded shield sleeve 1" (25 mm) onto base of elbow and secure with a constant force spring at 1/4" (6 mm) from bottom of elbow, as shown. Apply 2 wraps of Scotch® Super 33+™ Vinyl Electrical Tape over the spring and end of shield sleeve. (Figure 13.)
- 7.2 Pull loose end of shield sleeve to form it against previously applied semi-conducting cold shrink tube (step 3.2). Secure shield sleeve to cable metallic shield at base of semi-conducting tube with constant force spring, as shown. (Figure 13.)
- 7.3 Trim off excess shield sleeve and discard. Apply 2 wraps of Super 33+ Tape over spring and end of shield sleeve. (Figure 13.)

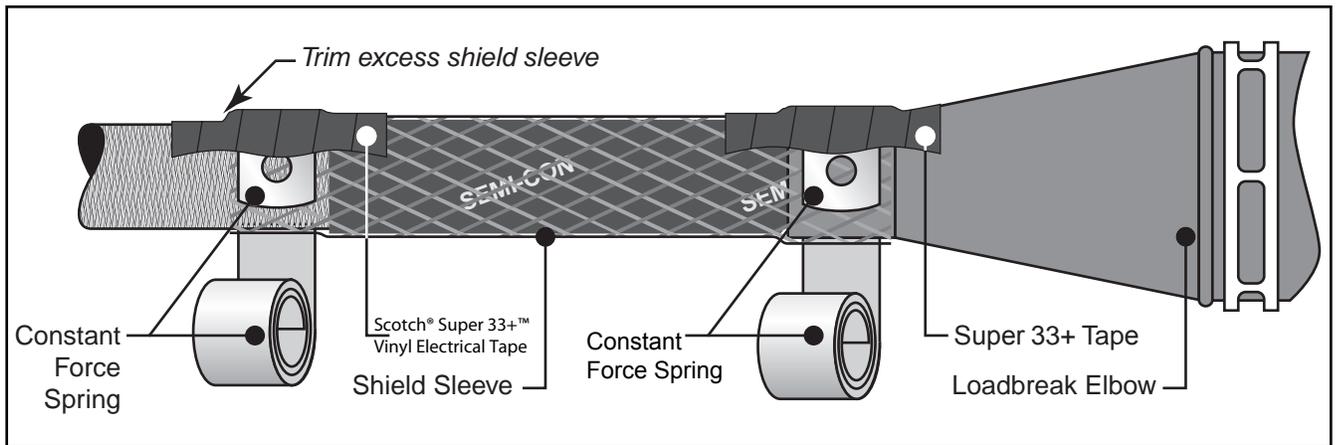


Figure 13

7.4 Slide “long” cold shrink jacketing tube over shield sleeve, aligning the tube (not the core) with the base of the elbow. Remove cold shrink core by UNWINDING COUNTERCLOCKWISE. (Figure 15.)

NOTE: Tube should overlap previously applied jacketing tube by at least 1" (25 mm).

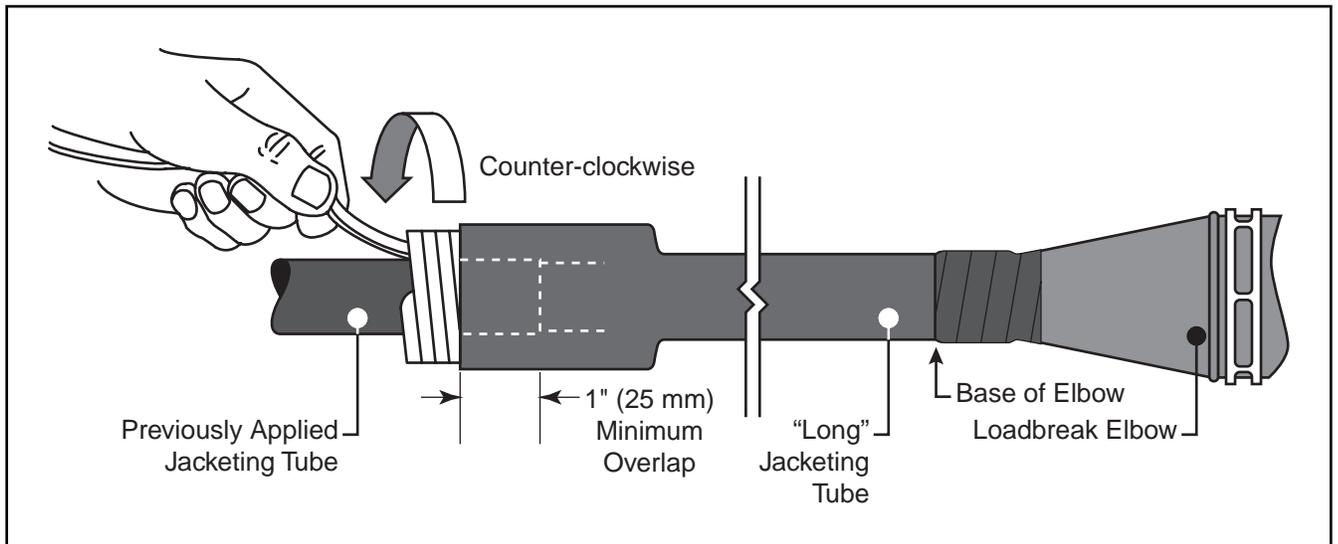


Figure 14

7.5 Slide “short” cold shrink jacketing tube onto tapered base of elbow, covering spring and Scotch® Super 33+™ Vinyl Electrical Tape. Remove cold shrink core by UNWINDING COUNTERCLOCKWISE. (Figure 15.)

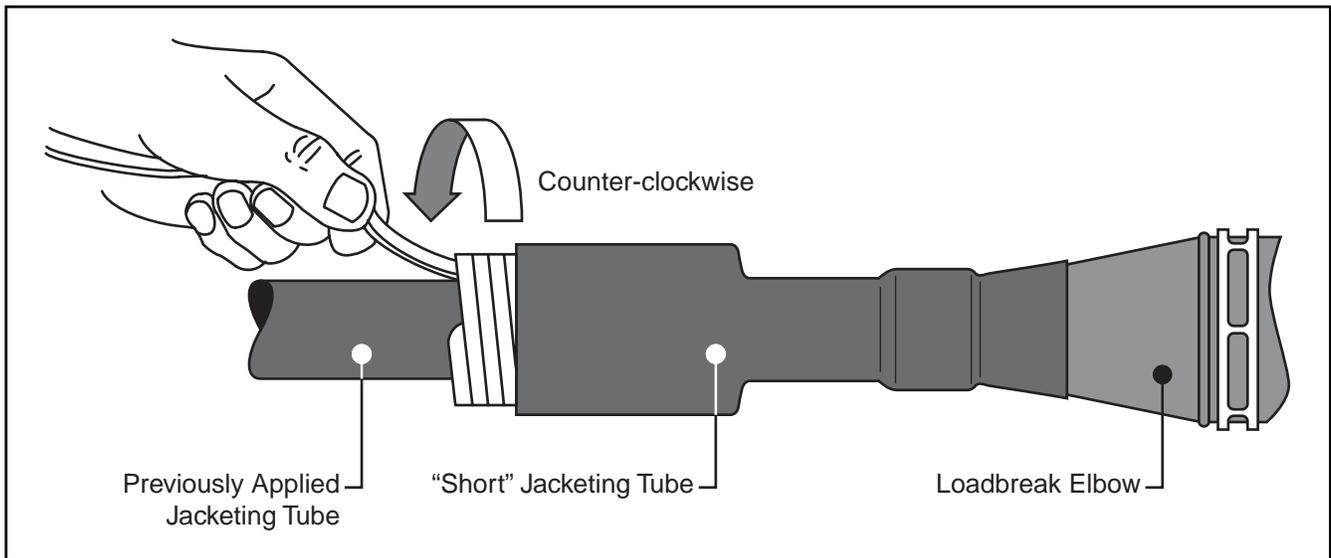


Figure 15

7.6 Repeat steps 7.1–7.5 for other 2 phase conductors.

8.0 Install 3M™ Sheath Seal Kit 5831

8.1 Remove the temporary wraps of Scotch® Super 33+™ Vinyl Electrical Tape that secured the 3-conductor ground braid in step 4.2. Temporarily position Ground Braid Assembly away from cable jacket. (Figure 16.)

8.2 Position spacer web collar over cable jacket, 1-1/2" (38 mm) from edge. Wrap spacer web for 1-1/4 wraps and cut-off excess. Split the 1/4 overlap and press into sides to hold in place, as shown. (Figure 16.)

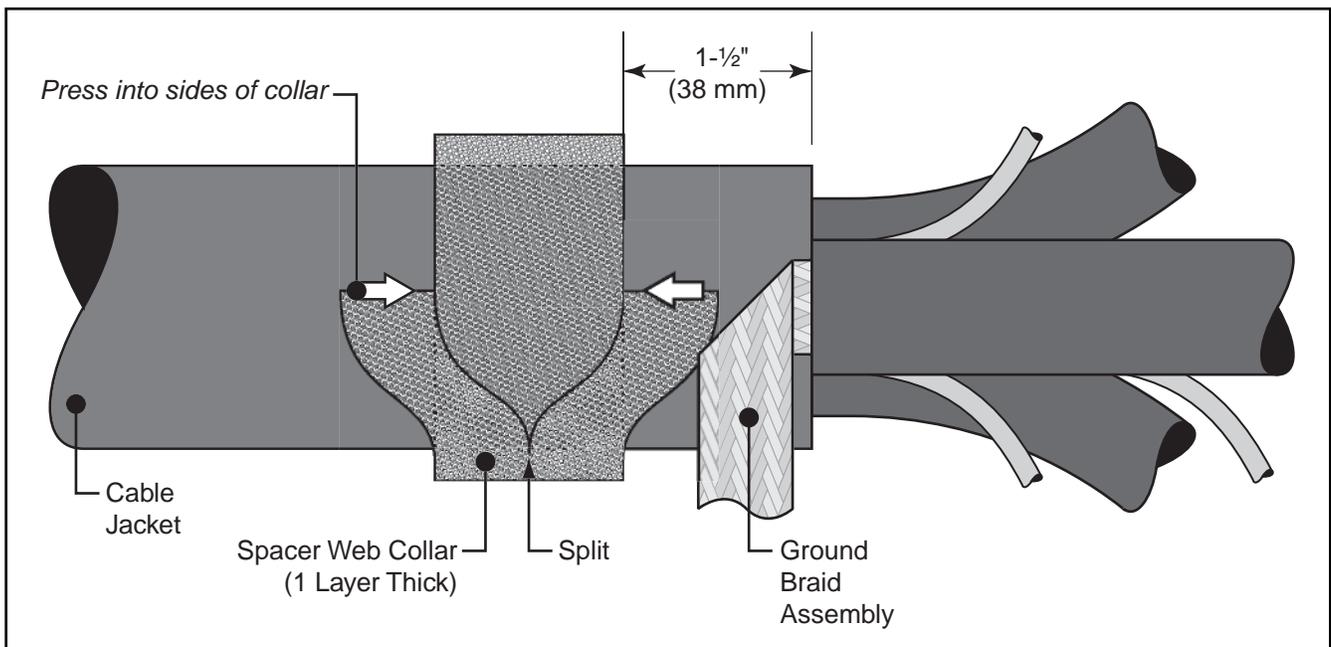


Figure 16

8.3 Position 3-Conductor Ground Braid Assembly and the 2 green ground wires* along the cable jacket and over the Spacer Web collar. (Figure 17.)

***NOTE: DO NOT INCLUDE THE GROUND CHECK. It should remain alongside the phase conductors.**

8.4 Wrap a 2nd spacer web collar over the 1st collar, 2 ground wires and ground braid. (Figure 17.)

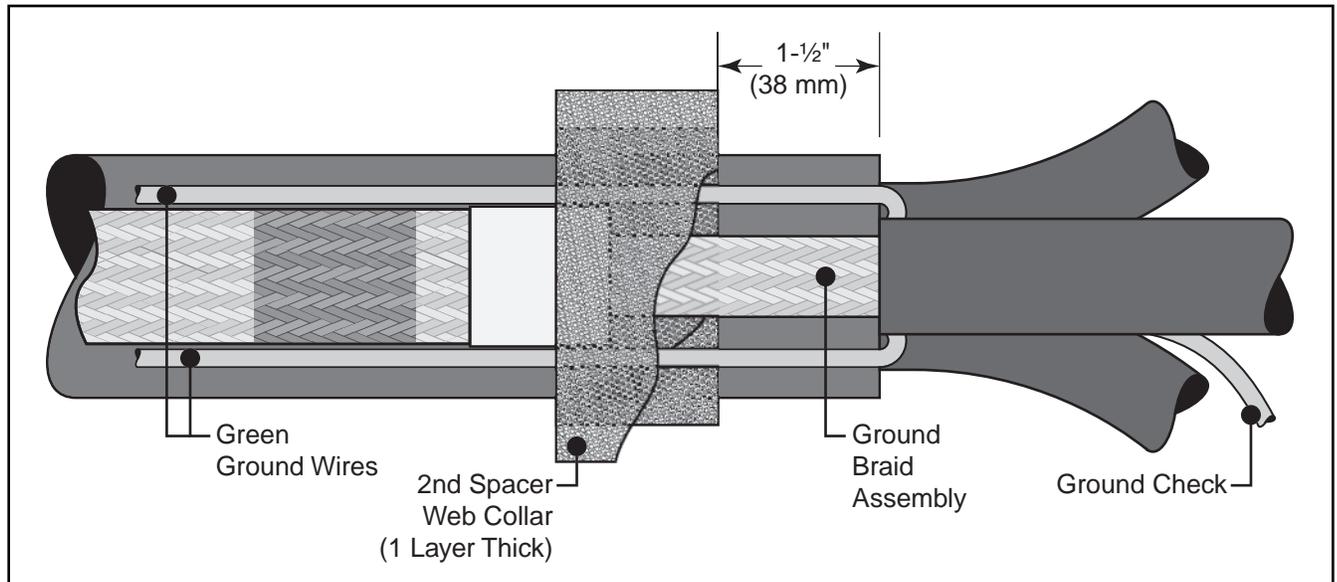


Figure 17

8.5 The curved vent slits on the mold are not used for this installation. Seal them on the outside of the mold with Scotch® Super 33+™ Vinyl Electrical Tape.

8.6 Support the cable, phase conductors and ground check in a straight vertical position.

8.7 Position mold over spacer web collar with the top edge extending 2-1/2" (64 mm) beyond the end of the cable jacket, as shown. (Figure 18.)

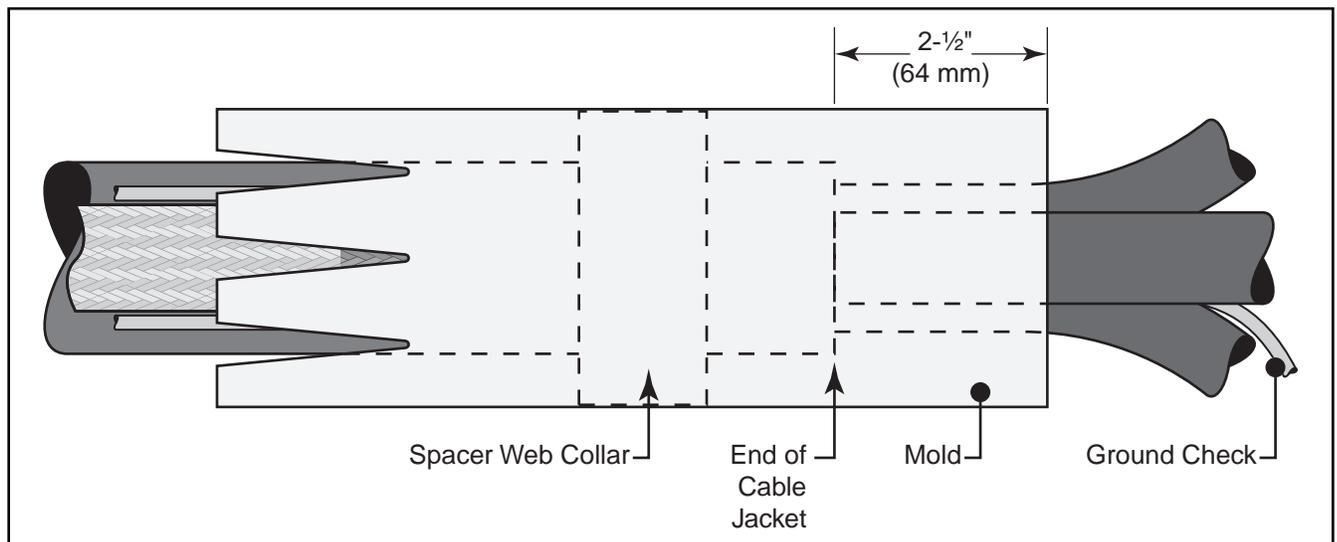


Figure 18

8.8 Wrap mold firmly around, tucking 1 edge under the other.

NOTE: The tucked edge must be straight to form a seal. (Figure 19.)

8.9 Position strap support onto mold, locating it over the spacer web collar. Secure it firmly with the mold strap. (Figure 19.)

- 8.10 Apply Mastic Strips (contained in 3M™ Loadbrak Elbow Kits 5811-B) around cable under the end of the mold fingers. Wrap mastic under and over the grounds to form a seal for the resin compound. (Figure 19.)
- 8.11 Bundle mold fingers evenly around cable, maintaining cable centering. Starting 1/2" (13 mm) on cable jacket, apply a half-lapped layer of Scotch® Linerless Rubber Splicing Tape 130C over the fingers. (Figure 19.)

NOTE: Apply 130C Tape with the tacky side up, with only enough tension to conform to the mold.

- 8.12 With cable end supported vertically, arrange conductors and ground check into final position. Allow a minimum clearance of 1/4" (6 mm) from edge of Mold.

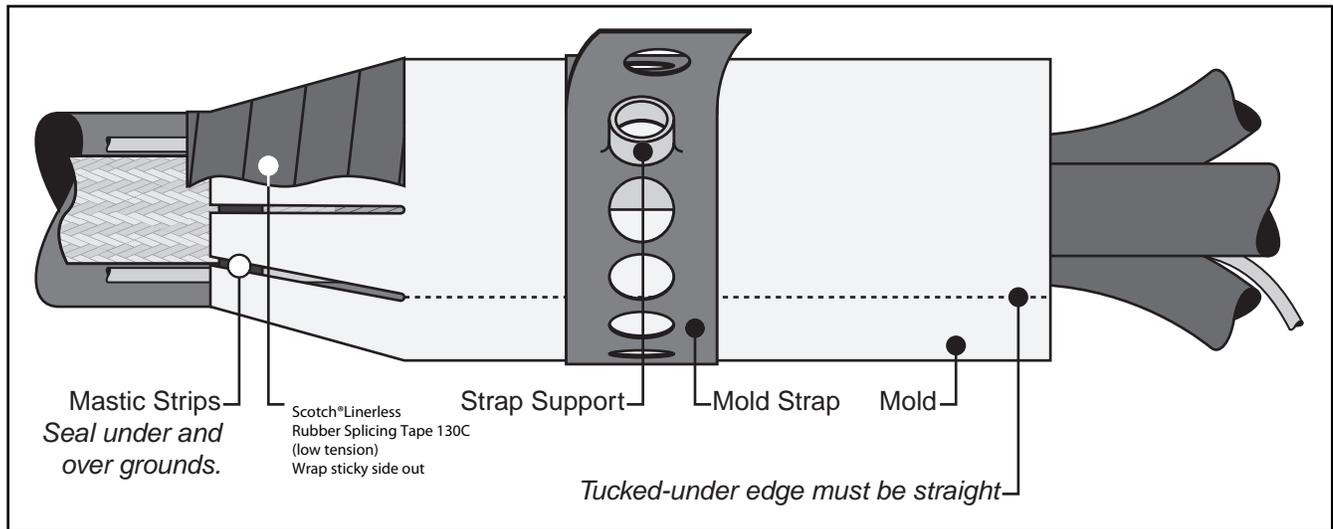


Figure 19

- 8.13 Pour 3M™ Scotchcast™ Compound 2131
 - a. Premix BLACK side of closed mixing pouch by squeezing to smooth consistency.
 - b. Firmly grasp opposite flat sides of closed mixing pouch near the center barrier; at the same time, pull sides of barrier apart and roll sides of thumbs through it. Separate barrier all of the way across to the side seals. (Figure 20.)

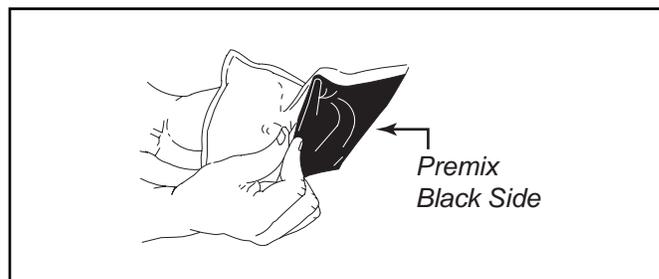


Figure 20

- c. Alternately squeeze ends of closed mixing pouch, forcing compound back and forth; strip compound from corners using fingers. Mix until color is completely uniform - 30-40 VIGOROUS SQUEEZES. DO NOT EXCEED 1 MINUTE. (Figure 21.)

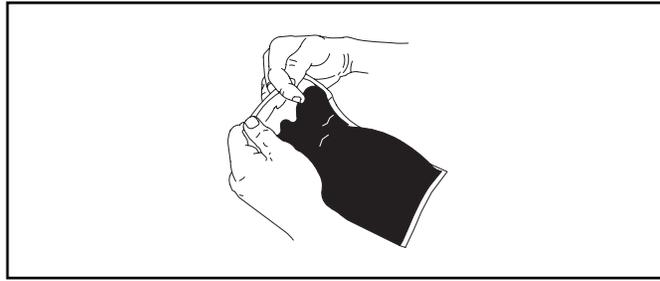


Figure 21

- d. Clip off a corner of the closed mixing pouch and immediately pour into open top of mold. If necessary, repeat with 2nd mixing pouch. Fill Mold to top edge.
- e. Allow compound to cure.

NOTE: 3M™ Sheath Seal may be de-molded when compound is no longer tacky.

8.14 De-mold

- a. Remove mold strap and funnel support.
- b. Remove Scotch®Linerless Rubber Splicing Tape 130C and lift mold fingers free from the compound.
- c. Remove mold

9.0 Operating Instructions

9.1 **Connect ground braid and cable ground wires to system ground.** Connect ground check per standard procedure.

9.2 **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 operation 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.

9.3 **Loadmake Operation:**

- a. Area must be clear of obstructions or contaminants that would interfere with the operation of the loadbreak elbow.
- b. Securely fasten a shotgun stick to the elbow pulling eye.
- c. Place the 3M™ 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.
- d. Immediately thrust the elbow onto the bushing with a fast, firm, straight motion, with sufficient force to latch the elbow to the bushing.

9.4. **Fault Close:**

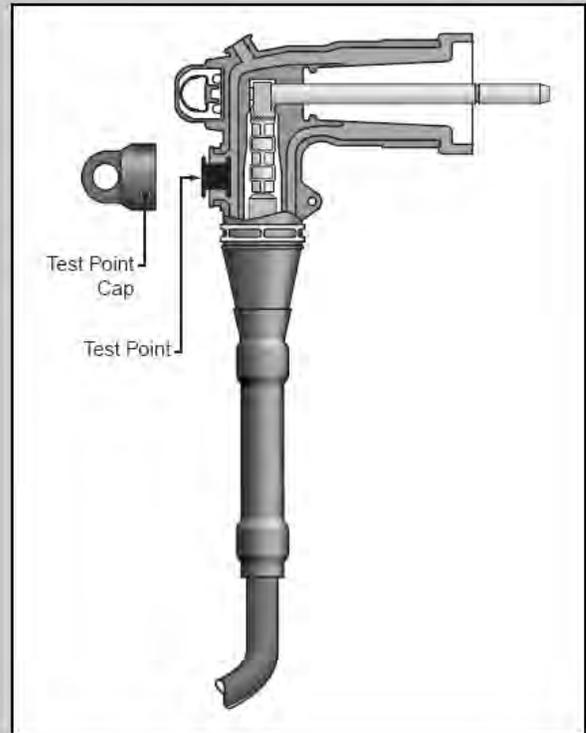
- a. It is not recommended that operations be made on known faults.
- b. If a fault is experienced, both the elbow connector and the bushing must be replaced.

9.5 Loadbreak Operation:

- a. Securely fasten a shotgun stick to the pulling eye.
- b. Without exerting any pulling force, slightly rotate the 3M™ Loadbreak Connector clockwise in order to break the surface friction between the elbow and bushing.
- c. Withdraw the connector from the bushing with a fast, firm straight motion, being careful not to place the connector near a ground plane.
- d. Place the connector on an appropriate accessory device, following the operating instructions for that accessory.

CAUTION: Capacitive Test Point Operating Instructions:

Use only Voltage indicating instruments specifically designed for test points. Use of conventional voltage sensing devices may provide false readings. The test point must be dry and free of contaminants when taking voltage measurements. After measurements are taken, clean, dry and lubricate the test point cap with silicone grease and assemble onto the test point.



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Electrical Markets Division
6801 River Place Blvd.
Austin, TX 78726-9000
800.245.3573
Fax 800.245.0329
www.3M.com/electrical

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