



# Cold Shrink QS-III Splicing Kit

## Instructions

IEEE Std. 404  
35 kV Class  
250 kV BIL



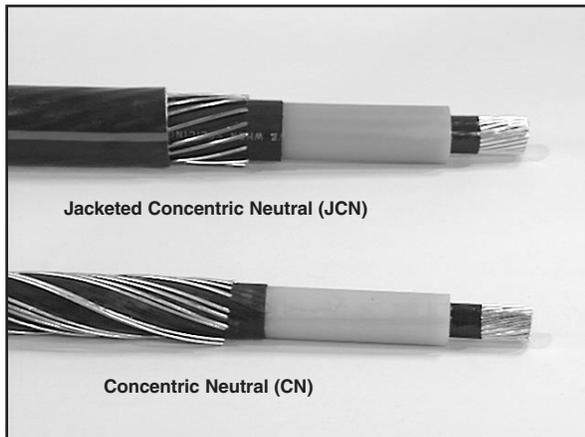
### Selection Chart

Kit Number	Cable Insulation O.D. Range	Conductor Size Range
5468A	1.24" to 2.07" (31,5 mm to 52,6 mm)	350–1000 kcmil* (185–500 mm <sup>2</sup> )

\* Splices (including size transitions) can be made to smaller or larger conductors (but larger conductors may require special neutral handling), provided both cables are within the Insulation O.D. Range and the connector meets the dimensional requirements shown below.

### Connector Dimensional Requirements

	Minimum inches (mm)	Maximum inches (mm)
<b>Outside Diameter</b>	0.87" (22,1 mm)	2.07" (52,6 mm)
<b>Length</b> Aluminum (Al/Cu)	-----	7.50" (191 mm)
<b>Length</b> Copper (Cu)	-----	8.25" (210 mm)



3M™ Cold Shrink  
QS-III Splicing Kit  
5468A

78-8125-9897-3-B

**CAUTION**  
Working around energized high-voltage systems may cause serious injury or death. Installation should be performed by personnel familiar with good safety practice in handling high-voltage electrical equipment. De-energize and ground all electrical systems before installing product.

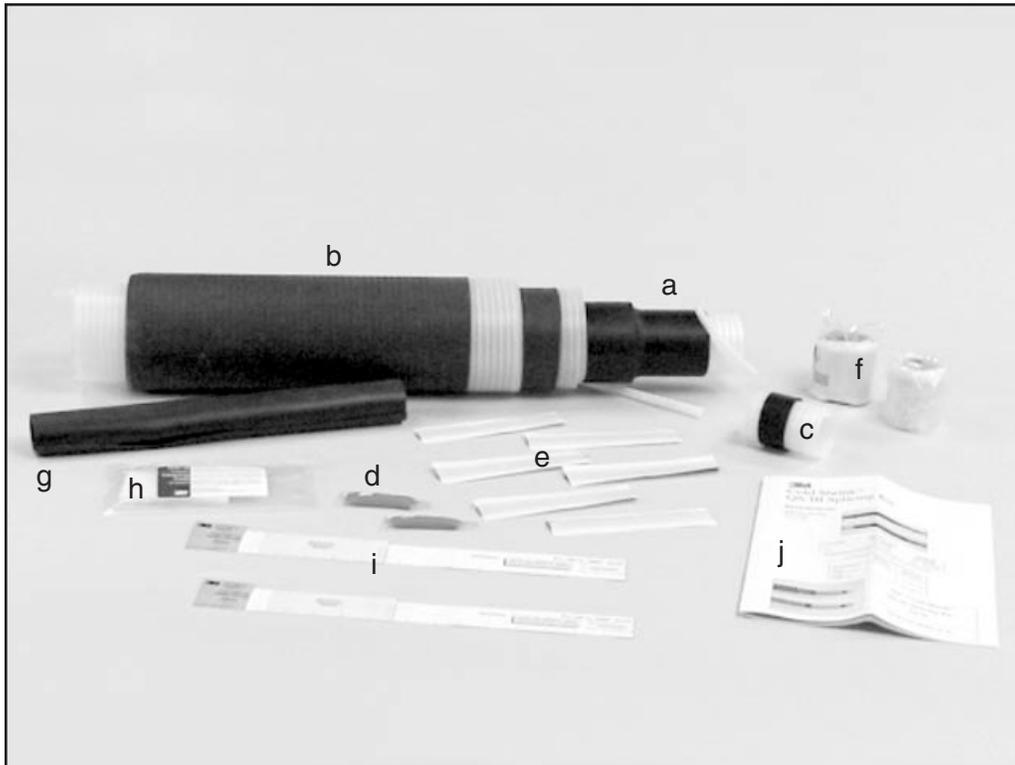
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## 1.0 Kit Contents:

1.1 Kit Contents are as follows:

- a) Cold Shrink 5468A Silicone Rubber Splice Body (1 ea.)
- b) Cold Shrink Jacketing Tube (1 ea.)
- c) Cold Shrink Adapter Tube (1 ea.)
- d) Red Compound Tubes (non-silicone grease) (2 ea.)
- e) Scotch™ 2230 Mastic Sealing Strips, 6" length (6 ea.)
- f) Scotch™ 2228 Rubber Mastic Tape Rolls (2 ea.)
- g) Neutral Pad (1 ea.)
- h) 3M™ CC-3 Cable Cleaning Pads (1 ea.)
- i) Cable Preparation Templates (2 ea.)
- j) Instruction Booklet (1 ea.)



**Note:** Connector not shown, but if included in the kit, it is indicated on the packaging label.

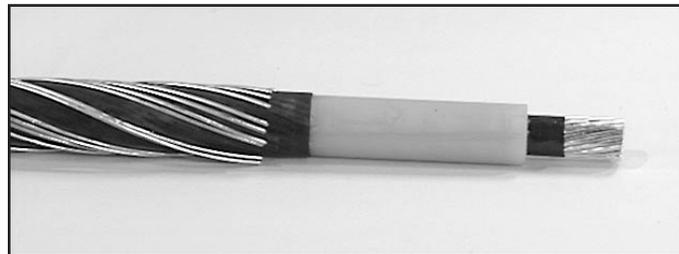
**Note:** Item "C," Cold Shrink Adapter Tube, may not be included in all kits.

**Note:** Kits contain either 1 or 2 of item "I," Cable Preparation Template, as needed per conductor size.

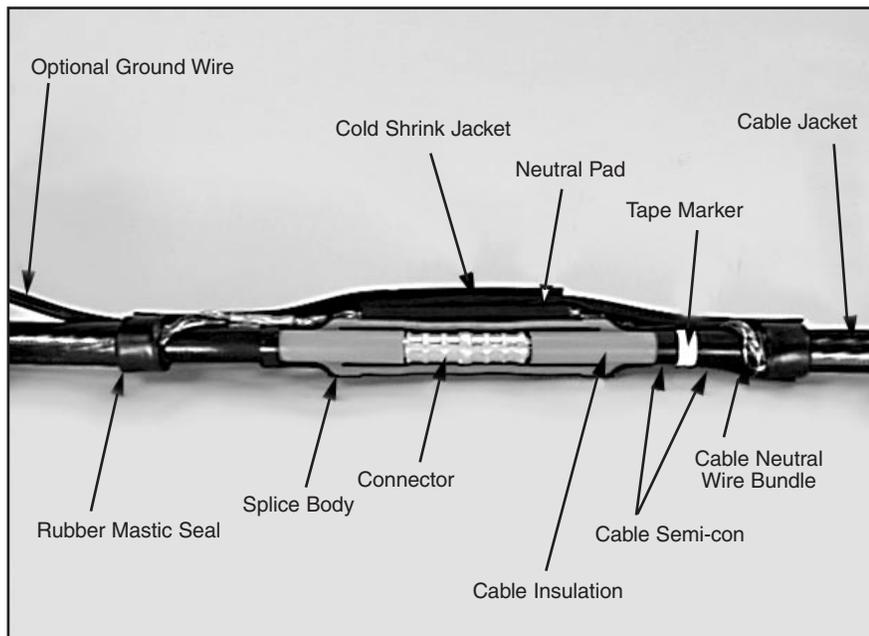
## 2.0 Instructions for Splicing Jacketed Concentric Neutral (JCN), Concentric Neutral (CN) Cables, and JCN to CN Transition Splices



**Jacketed Concentric Neutral (JCN)**



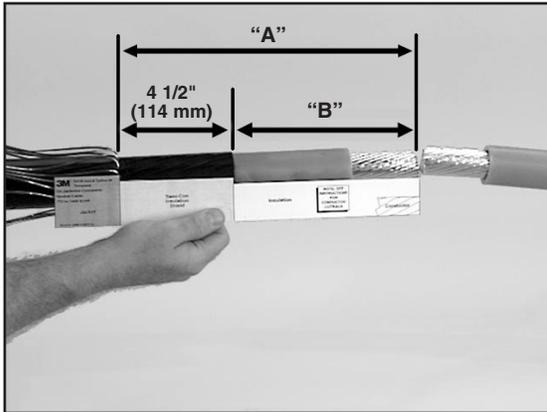
**Concentric Neutral (CN)**



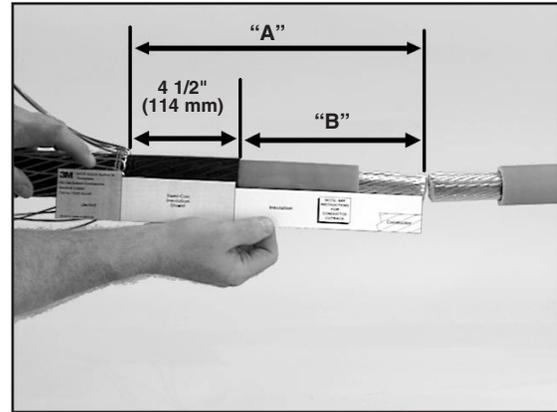
**Cutaway view (JCN)**

## 2.1 Prepare Cables

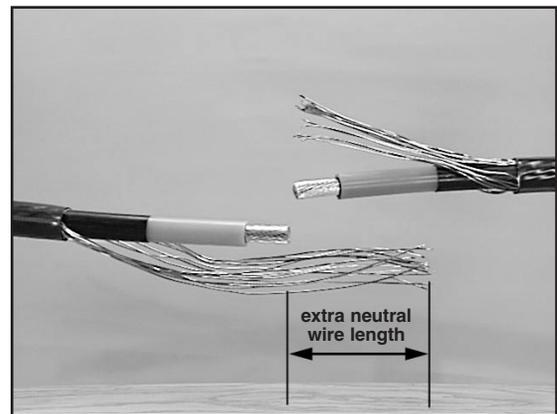
2.1.1 Prepare cables according to standard procedures. Refer to template provided or illustration below for proper dimensions. **Additional distance is required on one cable to provide extra neutral wire length for connecting the neutrals.**



**Jacketed Concentric Neutral (JCN)**



**Concentric Neutral (CN)**



Typical Conductor Size* kcmil (mm <sup>2</sup> )	Insulation OD Range Inches (mm)	Jacket Cutback "A" Inches (mm)	Semi-con Cutback "B" Inches (mm)
350**–500 (185–300)	1.24–1.70 (31,5–43,2)	13 3/4 (349)	9 1/4 (235)
750–1000** (325–500)	1.59–2.07 (40,4–52,6)	13 1/4 (337)	8 3/4 (222)

\*For 100% and 133% insulation levels, Insulation OD is the final determining factor.

\*\*Cables must be within the Insulation OD Range of the splice kit and the connector must meet the dimensional requirements shown on the front page.

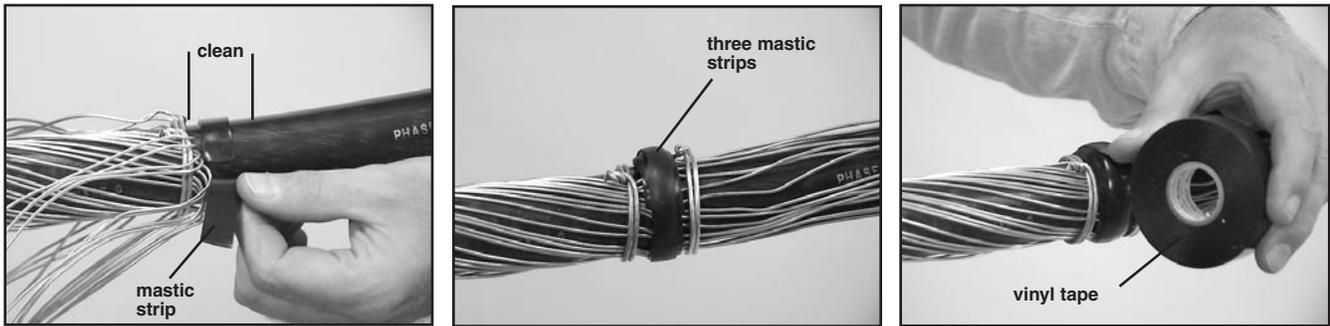
2.1.2 **JCN:** Carefully bend neutral wires back over edge of cable jackets. Press them against cables and temporarily secure with vinyl tape.

**For CN splices with exposed neutral connections:**

Carefully bend neutral wires back over binding (wire or tape). Press them against cables and temporarily secure with vinyl tape.

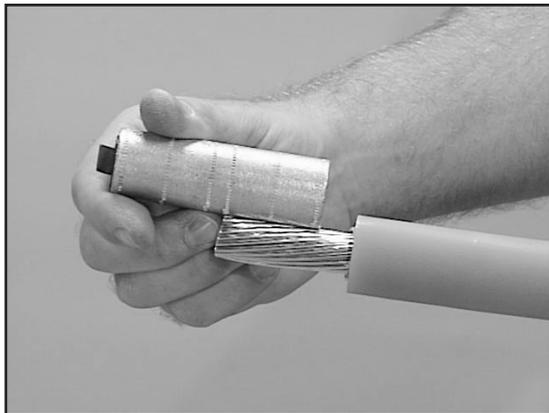
**For CN to JCN transition splices or CN splices with covered neutral connections (as shown below):**

Clean cable semi-con as shown. Place a strip of mastic around cable semi-con next to neutral binder. Fold neutrals into mastic and place another binder wire on the other side of the mastic. Wrap two additional strips of mastic over the first one and cover with two half lapped layers of vinyl tape. Fold neutrals over mastic seal and temporarily secure ends with vinyl tape.

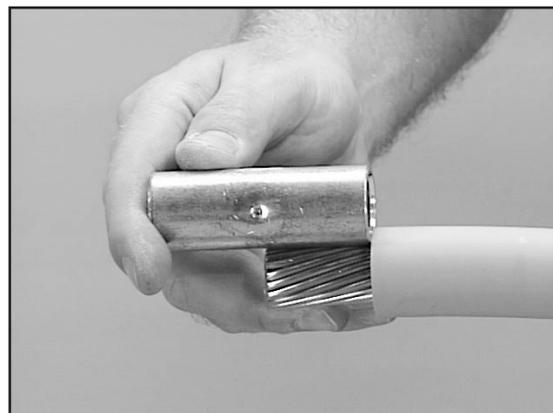


2.1.3 Remove cable insulation for 1/2 connector length plus an allowance \* for increases in connector length due to crimping. Insulation removal length shall not exceed 4 1/8" (105 mm) from conductor end. **Do not install connector now.**

*\*Note: This assumes that the installer has determined the increased length of an aluminum connector crimped with a specific tool and die.*



Aluminum Connector (Al / Cu)



Copper Connector (Cu)

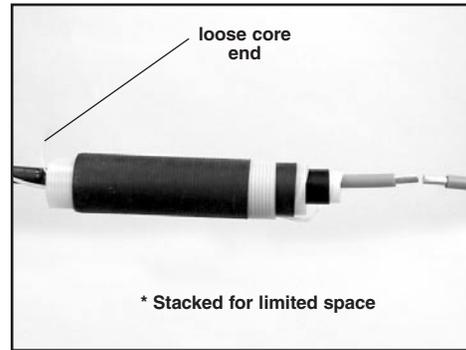
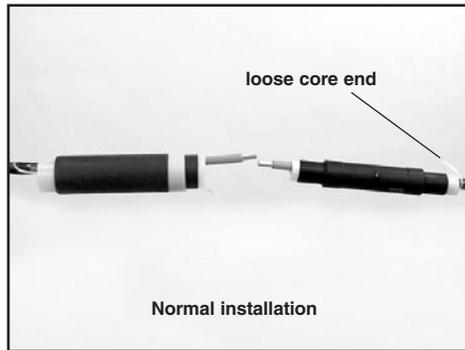
**Aluminum (Al/Cu) Connector Growth Chart**

Conductor Size	Typical growth allowance (per end)
350 kcmil	1/4" (6 mm)
500 kcmil	1/4" (6 mm)
750 kcmil	3/8" (10 mm)
1000 kcmil	3/8" (10 mm)

*Note: 1) Copper connectors do not require a length change allowance.  
2) Maximum aluminum connector crimped length allowed is 8.25" (210 mm).*

**Note:** *Jacketing is not optional. Cold shrink jacketing tube must be installed.*

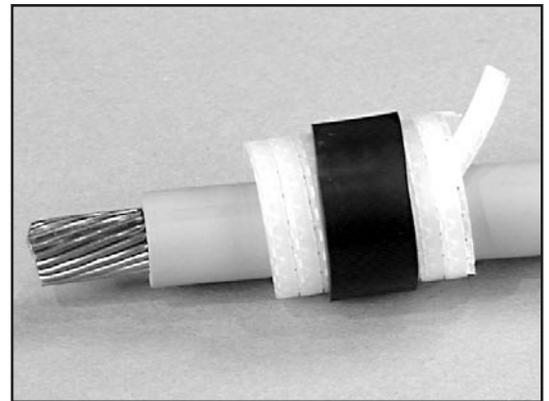
2.1.4 Clean or cover cable jacket if necessary, for cold shrink parking position. Slide jacketing tube onto one cable end. Slide splice body onto opposite cable, loose core end first. For size transitions, park splice on smaller cable.



**\*Note:** *If space is limited, the jacketing tube and splice body can be put on the cable stacked inside each other.*

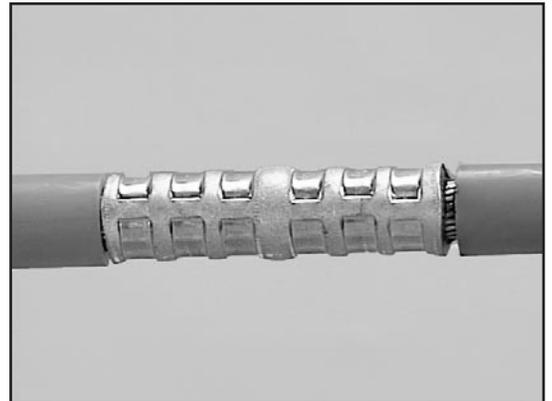
2.1.5 For 350 through 1000 kcmil copper connectors, 350 through 750 kcmil aluminum connectors, or connectors with an O.D. between 0.87–1.60" (22,1–40,6 mm):

Slide cold shrink adapter tube onto cable insulation.



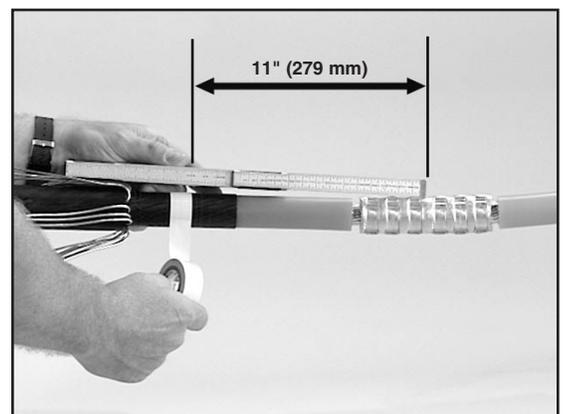
## 2.2 Install Splice

2.2.1 Install connector. See table (on cover) for proper connector dimensions. (For standard 3M™ connectors, refer to table at the end of this instruction for crimping information). Remove any excess oxidation inhibitor from connector ends if using an aluminum connector.



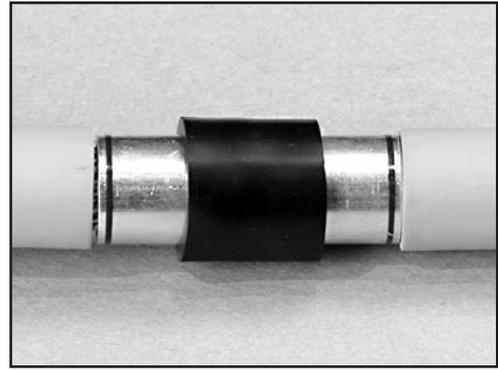
2.2.2 Apply a tape marker to semi-con insulation shield on cable which does not contain splice.

Measure 11" (279 mm) from center of connector.



2.2.3 If using cold shrink adapter tube:

Position adapter tube over the connector. Shrink adapter near center of connector by pulling and unwinding the loose core end in a counter-clockwise direction.

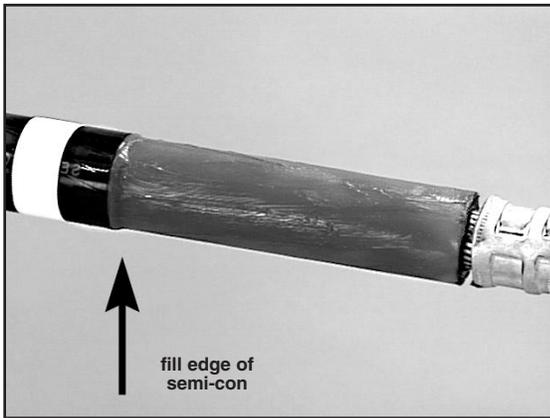


2.2.4 Clean cables using standard practice:

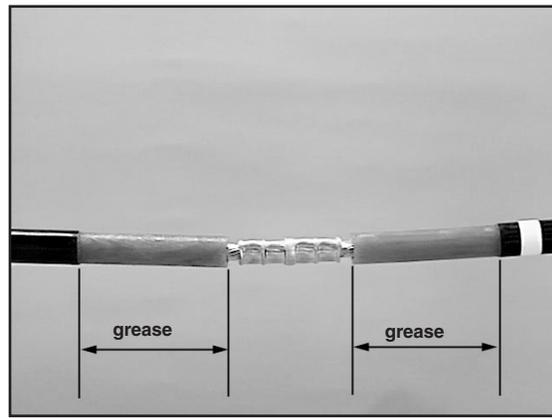
- a. Do not use solvent or abrasive on cable semi-conductive insulation shield.
- b. If abrasive is used on cable insulation, do not reduce diameter below the 1.24" (31,5 mm) minimum specified for the splice.

2.2.5 Apply red compound on cable insulation, making certain to fill in edge of cable semi-cons.

**Do not use silicone grease.**



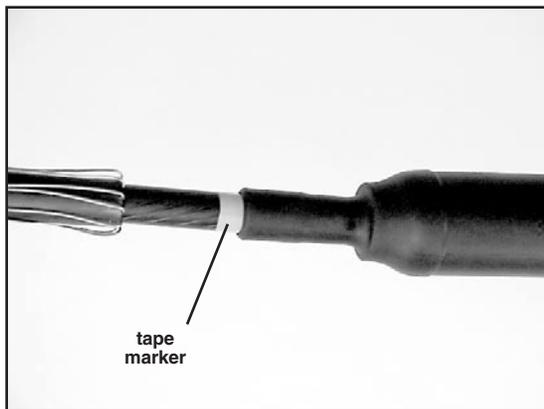
Compound filled at edge of semi-cons



Greased areas as noted

2.2.6 Position the splice body over connector area, aligning its end at the center of the tape marker. Slowly start to remove the splice core by pulling and unwinding the loose end counterclockwise, allowing only 1/4" (6 mm) of the splice to shrink onto the tape marker. Carefully slide the body off of the tape by pulling and twisting until the entire tape marker is exposed. Continue removing core to complete the splice body installation.

**Note:** *The splice body ends must overlap onto the semi-conducting layer of each cable by at least 1/2" (12,7 mm).*



**Note:** *Do not push the splice body towards the tape marker, as this may cause the end to roll under. If the end does roll under, DO NOT use sharp edged tools to pull it out as this could cut and damage the splice.*

# For JCN to JCN Splices

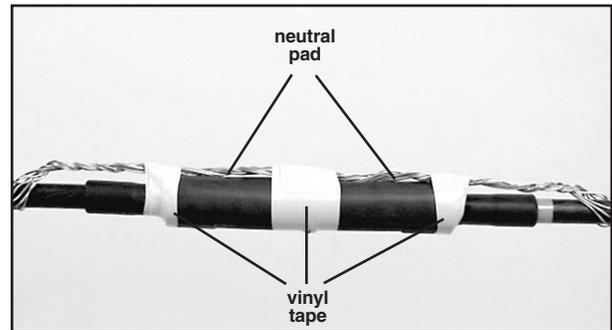
## 2.3 Connect Neutral Wires for JCN Splices

### 2.3.1 For bundled neutrals using neutral pad:

Center neutral pad on splice body. Remove temporary vinyl tape from neutral wires and connect with an inline compression connector (crimp sleeve). Route neutrals and connector over the neutral pad.

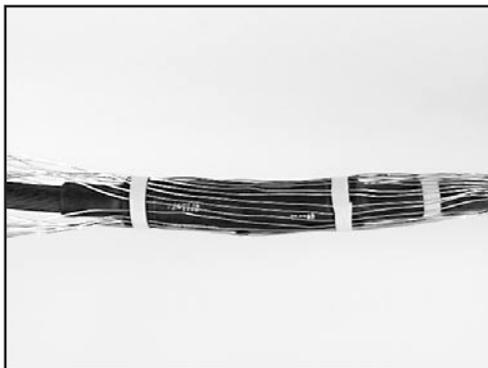
Apply two wraps of vinyl tape around each end of the neutral pad and over the connector.

**Go to step 2.4 Grounding (Optional) for JCN Splices.**



Bundled Neutral Connection

**For neutrals evenly spaced around splice body:** Center neutral pad on splice body. Route neutrals either straight or concentric around splice body and secure using vinyl tape.



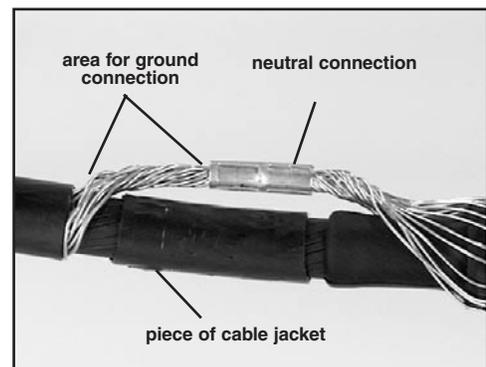
Neutrals straight across splice



Neutrals concentric across splice

Use a piece of cable jacket, removed during cable preparation, to cover and protect exposed cable semi-con under the area where the neutral and/or ground connection will be made. Secure with tape. Ensure that the cable jacket piece does not touch the splice body.

**Note:** *If grounding splice, leave sufficient neutral wire length to allow for a ground wire connection next to cable jacket or make both neutral and ground connections using a single connector.*



Non-bundled neutral connection

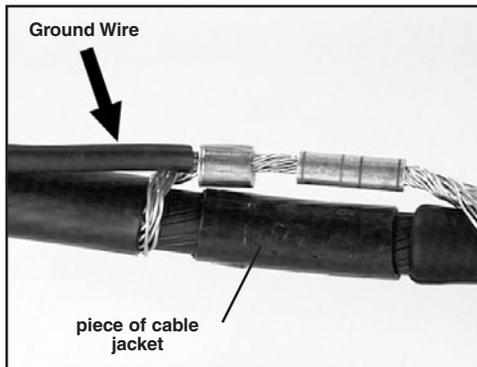
Connect neutrals using a suitable compression connector ("INLINE", "C", or "H" type) between jacket end and reduced splice diameter. Keep connector profile as low as possible. Crimp connector following the connector manufacturer's recommendation.

# For JCN to JCN Splices

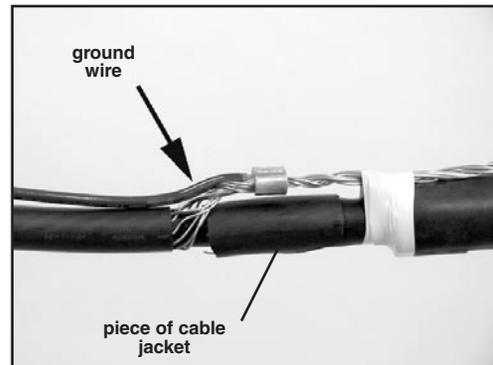
## 2.4 Grounding (Optional) for JCN Splices

*Note: Use these instructions if circuit grounding is required at this location.*

2.4.1 Connect a ground wire to the neutrals, in the area where the splice diameter is reduced. To protect the cable semicon, place a piece of cable jacket (removed during the cable preparation) under the ground connector. Ensure that the cable jacket piece does not touch the splice body. Keep connector profile as low as possible. For C-Tap or H-Tap connectors, position flat against the cable.



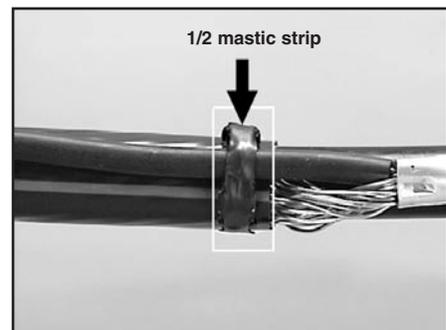
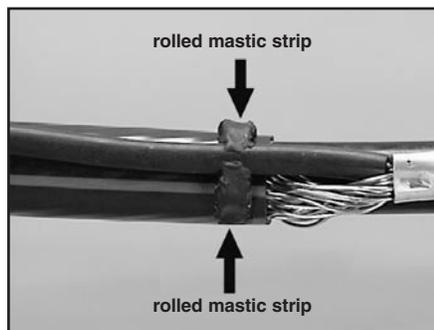
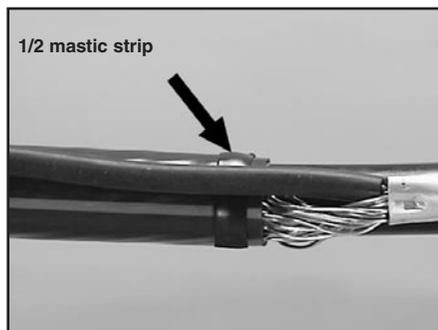
Ground Wire connection for non-bundled neutrals



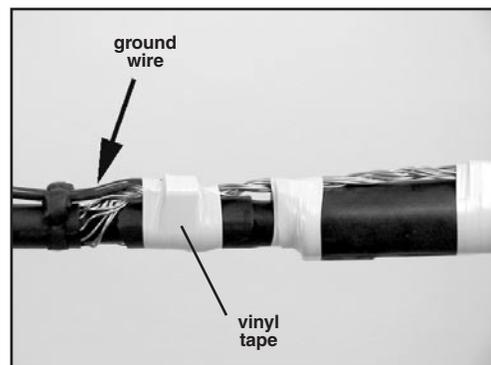
Ground Wire connection for bundled neutrals

2.4.2 Cut one mastic sealing strip into two equal pieces. Place one piece on the cable jacket centered under the ground wire, near the jacket end. Roll the two remaining full length mastic strips into small rolls.

Place one roll on each side of the ground wire. Place the other half strip over ground wire and two rolls. Press the mastic around the ground wire and to the cable jacket.



2.4.3 Overwrap the connectors with vinyl tape.

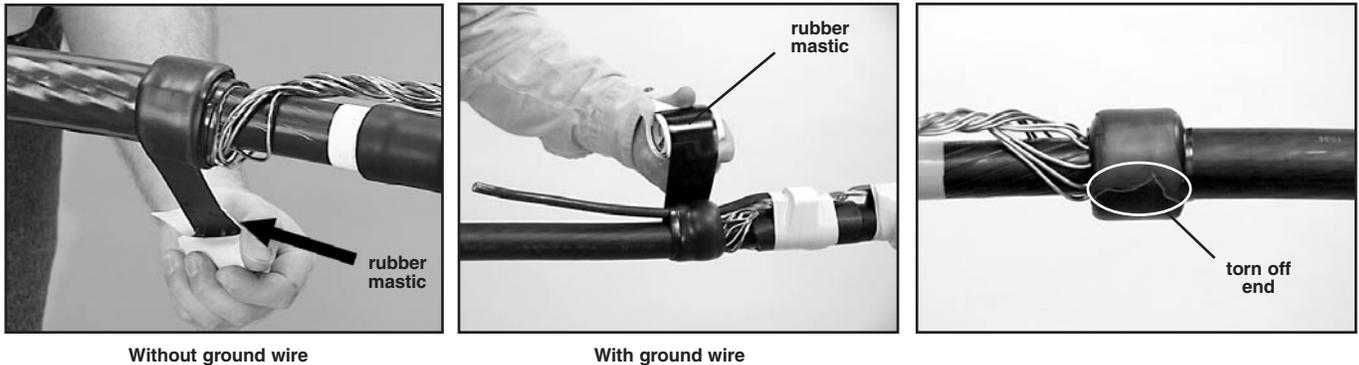


# For JCN to JCN Splices

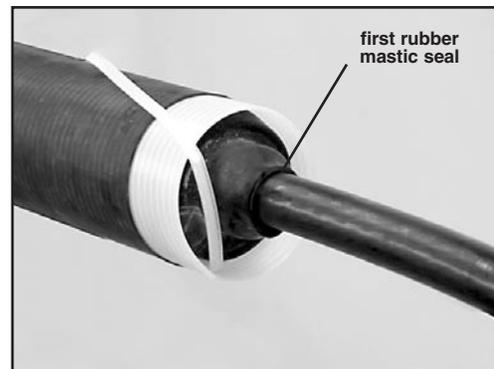
## 2.5 Install Jacket for JCN Splices

**Note:** *Jacketing is not optional.*

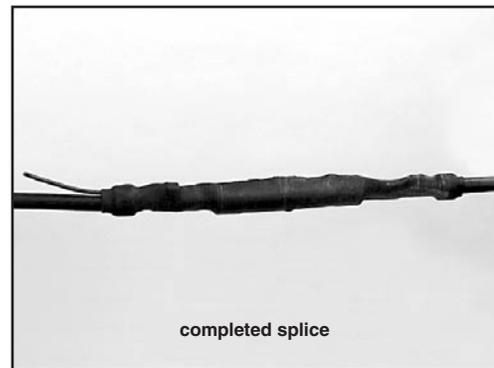
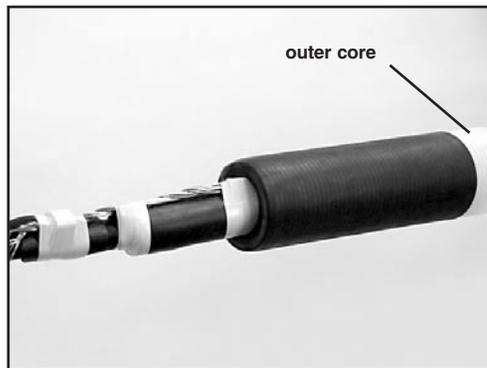
2.5.1 Apply one roll of slightly stretched rubber mastic tape around each jacket end (tacky side toward cable). If ground wire is connected, apply tape over mastic sealing strips. Stretch and tear off the end of the rubber mastic as shown.



2.5.2 Begin to install the cold shrink tube by completely covering the rubber mastic, and slowly pulling and unwinding the inner core counterclockwise toward the splice body. The outer core should remain relatively stationary while unwinding the inner core. If the outer core begins to move towards the first mastic seal, gently pull the outer core and jacketing tube towards the second mastic seal and continue unwinding the inner core.



2.5.3 Continue to install the cold shrink tube over the rubber mastic on the other cable by slowly pulling and unwinding the outer core counterclockwise. This portion of the cold shrink tube installs differently than typical cold shrink products in that as the tube shrinks, the end rolls under. The tube may need a slight push to get over the second mastic seal.



**Note:** *In applications where the splice is regularly exposed to high levels of ultra-violet radiation (i.e. direct sunlight), wrap two half-lapped layers of Scotch™ Super 33+ or Scotch™ Super 88 vinyl tape over the re-jacketing tubes.*

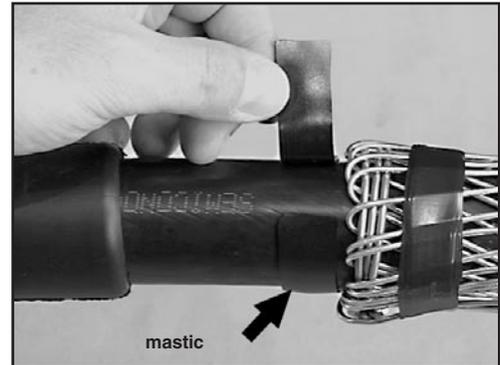
**Note:** *Connect optional grounding.*

# For CN to CN Splices

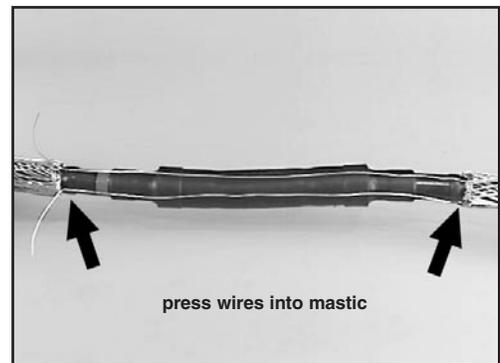
## 2.6 Connect Neutral Wires for CN Splices

### 2.6.1 For splices with exposed neutral connections:

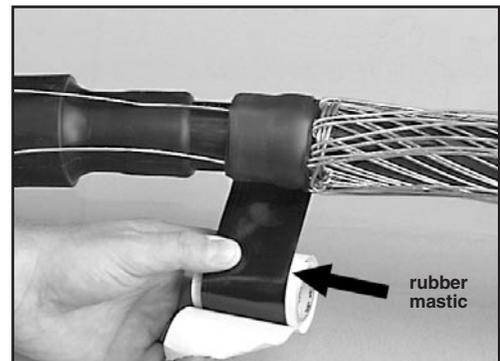
Apply a mastic strip around the semi-con jacket of each cable at the location where neutral wires are bent back.



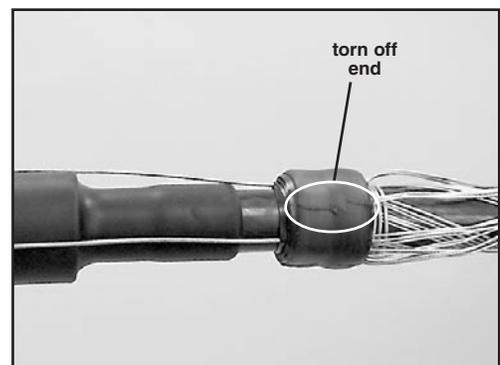
Run two solid bare wires across the splice and press them into the mastic on both cables. Leave 10" - 12" of extra wire past each mastic.



Apply one roll of slightly stretched rubber mastic tape over each mastic strip (tacky side towards cable).



Stretch and tear off the end of the rubber mastic as shown.



Go to step 2.7 Install Jacket for CN Splices.

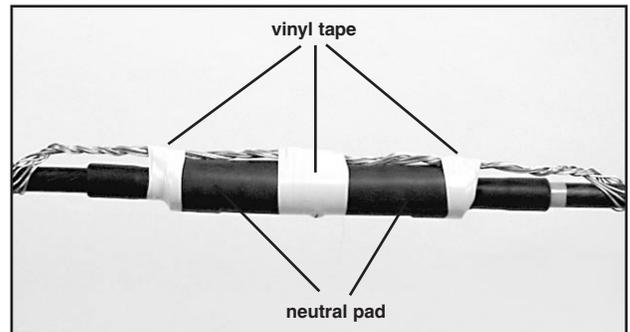
# For CN to CN Splices

## 2.6.2 For splices with covered neutral connections:

### For bundled neutrals using neutral pad:

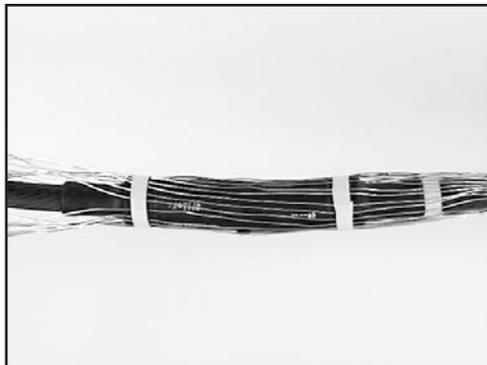
Center neutral pad on splice body. Remove temporary vinyl tape from neutrals, connect with an inline compression connector (crimp type). Route neutrals and connector over neutral pad and secure ends with vinyl tape. Wrap vinyl tape over the connector.

Go to step 2.6.3.

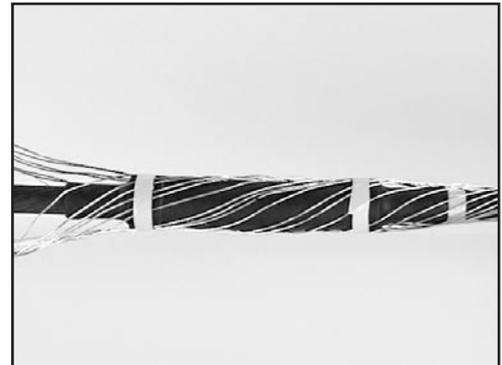


Bundled Neutral connection

**For neutrals evenly spaced around splice body:** Center neutral pad on splice body. Route neutrals either straight or concentrically around splice body and secure using vinyl tape.



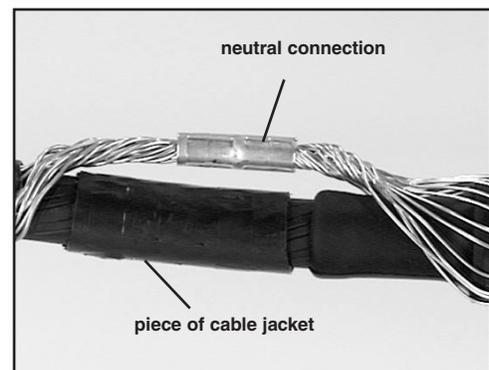
Neutrals straight across splice



Neutrals concentric across splice

Use a piece of cable jacket, removed during cable preparation, to cover and protect exposed cable semi-con under the area where the neutral and/or ground connection will be made. Secure with tape. Ensure that the cable jacket piece does not touch the splice body.

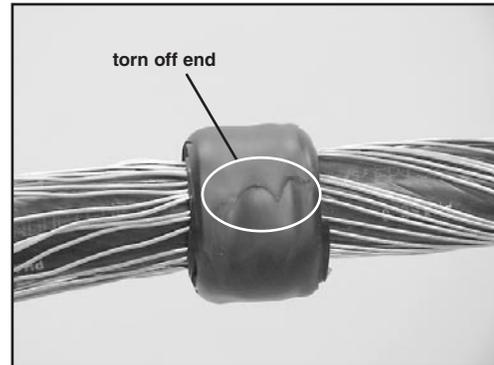
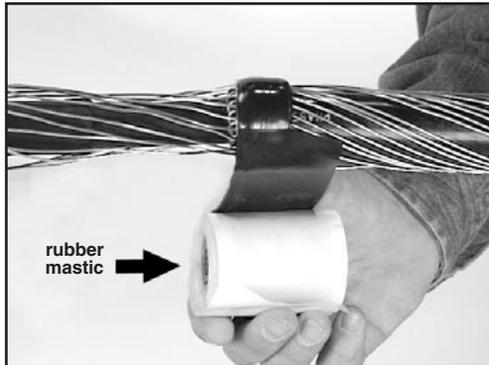
Connect neutrals using a suitable compression connector ("INLINE", "C", or "H" type) between jacket end and reduced splice diameter. Keep connector profile as low as possible. Crimp connector following the connector manufacturer's recommendation.



Non-bundled neutral connection

# For CN to CN Splices

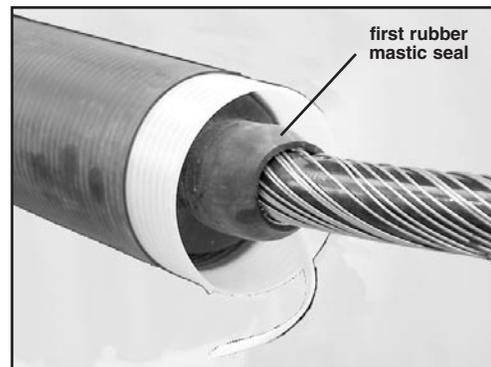
2.6.3 Apply one roll of slightly stretched rubber mastic over each mastic seal (tacky side toward cable). Stretch and tear off the end of the rubber mastic as shown.



## 2.7 Install Jacket for CN Splices

**Note:** *Jacketing is not optional.*

2.7.1 Begin to install the cold shrink tube by completely covering the rubber mastic, and slowly pulling and unwinding the inner core counterclockwise toward the splice body. The outer core should remain relatively stationary while unwinding the inner core. If the outer core begins to move towards the first mastic seal, gently pull the outer core and jacketing tube towards the second mastic seal and continue unwinding the inner core.



2.7.2 Continue to install the cold shrink tube over the rubber mastic on the other cable by slowly pulling and unwinding the outer core counterclockwise. This portion of the cold shrink tube installs differently than typical cold shrink products in that as the tube shrinks, the end rolls under. The tube may need a slight push to get over the second mastic seal.

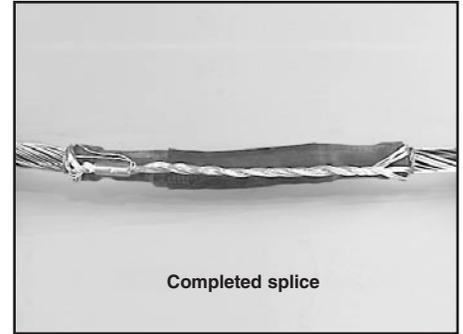


# For CN to CN Splices

2.7.3 **For exposed neutral connection:** Route neutrals over splice and connect. Include two wires routed under splice jacket.

**Note:** *In applications where the splice is regularly exposed to high levels of ultra-violet radiation (i.e. direct sunlight), wrap two half-lapped layers of Scotch™ Super 33+ or Scotch™ Super 88 vinyl tape over the re-jacketing tubes.*

**Note:** *If circuit grounding is required at this splice location, connect to exposed neutral wires.*



# For CN to JCN Transition Splices

## 2.8 Connecting Neutral Wires for Transition Splices

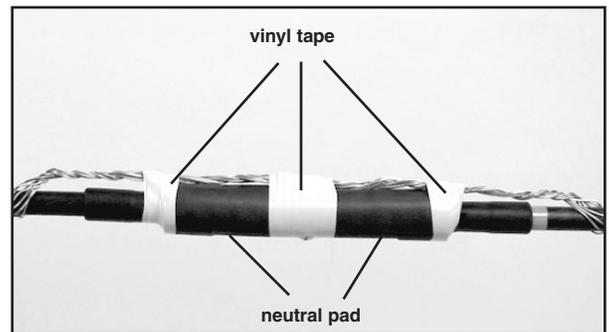
### 2.8.1 For bundled neutrals using neutral pad:

Center neutral pad on splice body. Remove temporary vinyl tape from neutral wires and connect with an inline compression connector (crimp sleeve). Route neutrals and connector over the neutral pad.

Apply two wraps of vinyl tape around each end of the neutral pad and over the connector.

**Go to step 2.9 Grounding (Optional) for Transition Splices.**

**For neutrals evenly spaced around splice body:** Center neutral pad on splice body. Route neutrals either straight or concentric around splice body and secure using vinyl tape.



Bundled Neutral connection



Neutrals straight across splice

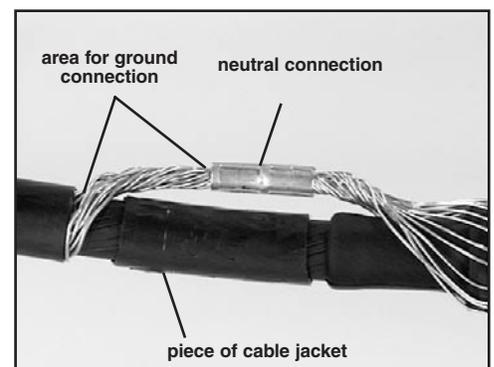


Neutrals concentric across splice

Use a piece of cable jacket, removed during cable preparation, to cover and protect exposed cable semi-con under the area where the neutral and/or ground connection will be made. Secure with tape. Ensure that the cable jacket is piece does not touch the splice body.

**Note:** *If grounding splice, leave sufficient neutral wire length to allow for a ground wire connection next to cable jacket or make both neutral and ground connections using a single connector.*

Connect neutrals using a suitable compression connector ("INLINE", "C", or "H" type) between jacket end and reduced splice diameter. Keep connector profile as low as possible. Crimp connector following the connector manufacturer's recommendation.



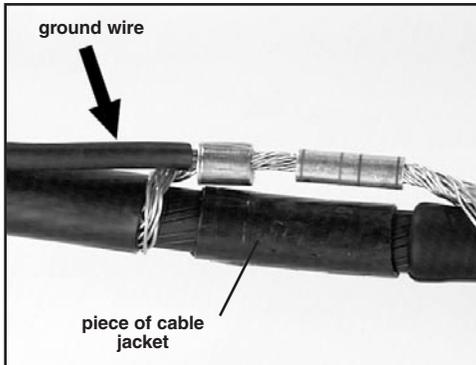
Non-bundled neutral connection

# For CN to JCN Transition Splices

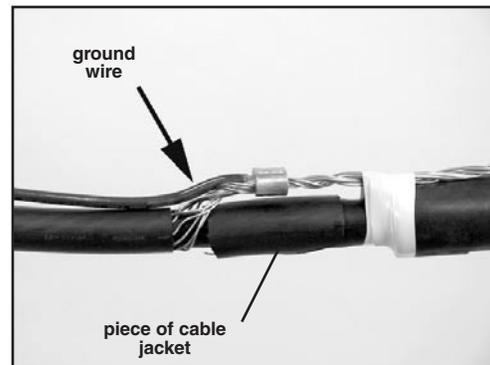
## 2.9 Grounding (Optional) for Transition Splices

*Note: Use these instructions if circuit grounding is required at this location.*

2.9.1 Connect a ground wire to the neutrals, in the area where the splice diameter is reduced. To protect the cable semicon, place a piece of cable jacket (removed during the cable preparation) under the ground connector. Ensure that the cable jacket piece does not touch the splice body. Keep connector profile as low as possible. For C-Tap or H-Tap connectors, position flat against the cable.



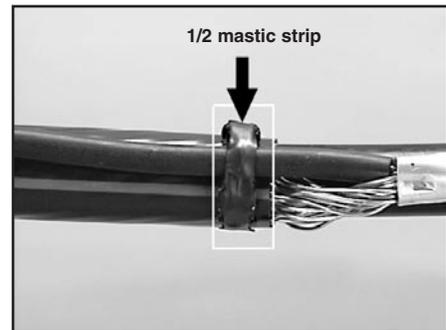
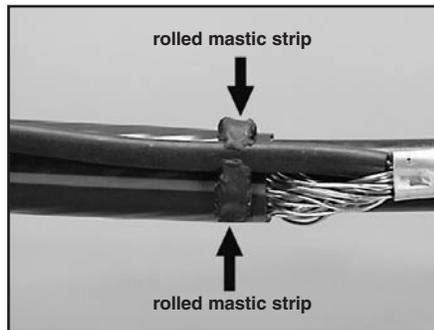
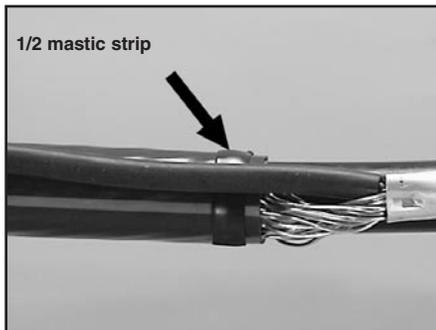
Ground wire connection for non-bundled neutrals



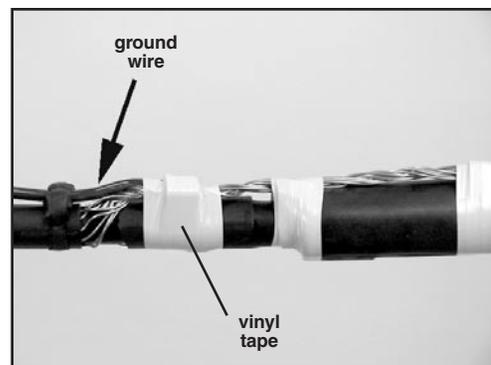
Ground Wire connection for bundled neutrals

2.9.2 Cut one mastic sealing strip into two equal pieces. Place one piece on the cable jacket centered under the ground wire, near the jacket end. Roll the two remaining full length mastic strips into small rolls.

Place one roll on each side of the ground wire. Place the other half strip over ground wire and two rolls. Press the mastic around the ground wire and to the cable jacket.



2.9.3 Overwrap the connectors with vinyl tape.



# For CN to JCN Transition Splices

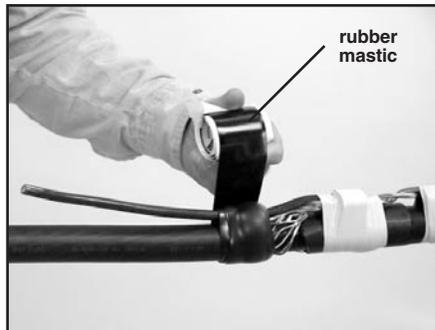
## 3.0 Install Jacket for Transition Splices

**Note:** *Jacketing is not optional.*

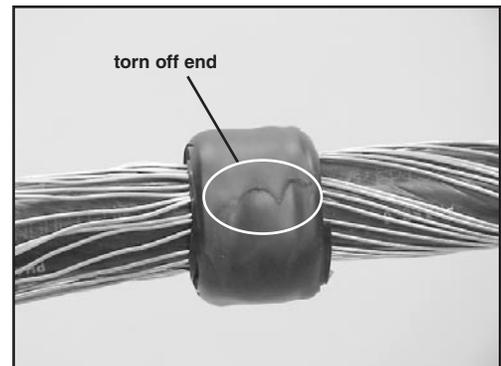
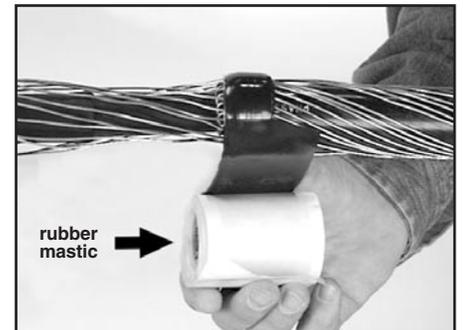
3.1.1 Apply one roll of slightly stretched rubber mastic tape around JCN cable jacket end (tacky side toward cable). If ground wire is connected, apply rubber tape over mastic sealing strips. Apply one roll of rubber mastic tape over CN cable mastic seal (tacky side toward cable). Stretch and tear off the end of the rubber mastic as shown.



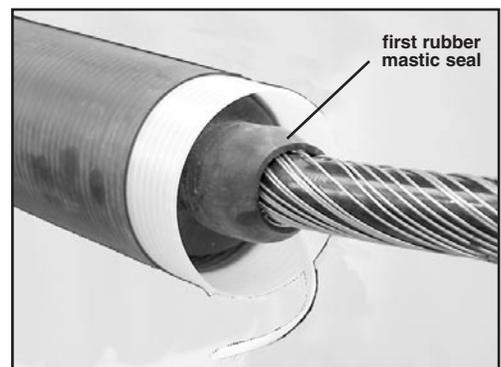
Without ground wire



With ground wire

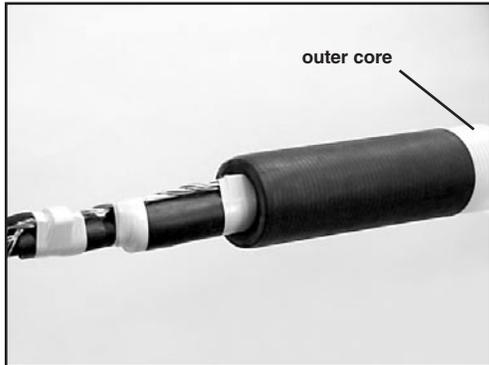


3.1.2 Begin to install the cold shrink tube by completely covering the rubber mastic, and slowly pulling and unwinding the inner core counterclockwise toward the splice body. The outer core should remain relatively stationary while unwinding the inner core. If the outer core begins to move towards the first mastic seal, gently pull the outer core and jacketing tube towards the second mastic seal and continue unwinding the inner core.



# For CN to JCN Transition Splices

- 3.1.3 Continue to install the cold shrink tube over the rubber mastic on the other cable by slowly pulling and unwinding the outer core counterclockwise. This portion of the cold shrink tube installs differently than typical cold shrink products in that as the tube shrinks, the end rolls under. The tube may need a slight push to get over the second mastic seal.



**Note:** *In applications where the splice is regularly exposed to high levels of ultra-violet radiation (i.e. direct sunlight), wrap two half-lapped layers of Scotch™ Super 33+ or Scotch™ Super 88 vinyl tape over the re-jacketing tubes.*

**Note:** *Connect optional grounding.*

**Crimping Tool - Die Sets (number of crimps/end)**

3M™ Connector Number	Conductor Size (kcmil)	Burndy			Thomas & Betts Corp.			Square D Co. Anderson Div.	
		Y34A	Y35, Y39 Y45*, Y46*	Y1000**	TBM 8	TBM 12	TBM 15	VC6-3** VC6-FT**	VC8C**
10011 (Cu)	350	A31R (2)	U31RT (2)	—	Red (3)	—	71H (3)	(2)	—
20011 (Al/Cu)	350	—	U31ART (2)	(1)	—	87H (3)	87H (3)	(2)	—
11011 (Cu)	350	A31R (3)	U31RT (3)	—	Red (4)	—	71H (4)	(3)	—
CI-350 (Al/Cu)	350	—	U31ART (2)	—	—	87H (2)	87H (2)	(3)	—
20012 (Al/Cu)	400	—	U32ART (4)	(1)	—	94H (4)	94H (4)	(2)	(2)
10014 (Cu)	500	A34R (2)	U34RT (2)	—	Brown (3)	—	87H (3)	(2)	—
20014 (Al/Cu)	500	—	U34ART (4)	(1)	—	106H (3)	106H (4)	(2)	(2)
11014 (Cu)	500	A34R (4)	U34RT (3)	—	Brown (4)	—	87H (4)	(3)	—
CI-500 (Al/Cu)	500	—	U34ART (3)	—	—	—	106H (3)	(3)	—
20016 (Al/Cu)	600	—	U36ART (4)	(1)	—	—	115H (3)	(3)	(3)
10019 (Cu)	750	—	U39RT (3)	—	—	—	106H (3)	—	—
20019 (Al/Cu)	750	—	U39ART (4)	—	—	—	125H (5)	(3)	(3)
11019 (Cu)	750	—	U39RT (5)	—	—	—	106H (4)	—	—
CI-750 (Al/Cu)	750	—	U39ART (3)	—	—	—	125H (3)	(3)	—
10024 (Cu)	1000	—	S44RT, P44RT (4)	—	—	—	125H (3)	—	—
20024 (Al/Cu)	1000	—	S44ART, P44ART (4)	—	—	—	140H (4)	—	—
11024 (Cu)	1000	—	S44RT, P44RT (4)	—	—	—	125H (4)	—	—

\*Y45 and Y46 accept all Y35 dies ("U Series"). For Y45, use PT6515 adapter. For Y46, use PUADP adapter.

\*\*Anderson VC6-3, VC6-FT, VC8C and Burndy Y1000 require no die set.

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**Note:** The core material being removed from the Splice Body and Jacket Tubes are 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.

**Warranty; Limited Remedy; Limited Liability.** This product will be free from defects in material and manufacture as of the date of purchase. **3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** If this product is defective within the warranty period stated above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the 3M product. **Except where prohibited by law, 3M will not be liable for any loss or damage arising from this 3M product, whether direct, indirect, special, incidental or consequential regardless of the legal theory asserted.**



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