



Cold Shrink QS-III Three-Conductor Splice Kit for use on Armor and Non-Armor Cables

Instructions

IEEE Std. 404
25/28 kV Class
200 kV BIL

Cable Range Requirements

Kit Number	Cable Insulation O.D. Range	Conductor Size Range
5786A-MT	0.84" to 1.36" (21,3 mm to 34,5 mm)	1 AWG - 250 kcmil* (50 - 120 mm ²)

* Splices (including size transitions) can be made to smaller or larger conductors, 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)
Outside Diameter	0.46" (11,7 mm)	1.36" (34,5 mm)
Length Aluminum (Al/Cu)	-----	4.00" (102 mm)
Length Copper (Cu)	-----	4.50" (114 mm)



3M™ Cold Shrink
QS-III Splicing Kit
5786A-MT

78-8126-0371-6-A

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:

- 3Cold Shrink 5456A QS-III Silicone Splice Bodies
- 6Tubes, P55/R Red Compound
- 3Metallic Shield Sleeves
- 6Constant Force Spring Shield Connectors (0.87" I.D.)
- 1Armor to Armor Continuity Braid
- 2Constant Force Spring Braid Connectors (1.54" I.D.)
- 2Cold Shrink Jacket Tubes
- 13M™ CC-2 Cable Preparation Kit
- 1Roll, Scotch™ 33+ Vinyl Electrical Tape (3/4" x 66')
- 4Rolls, Scotch™ Super 88 Vinyl Electrical Tape (1 1/2" x 44')
- 3Rolls, Scotch-Seal™ 2229 Mastic Tape (3 3/4" x 10')
- 1Roll, Scotch™ 24 Electrical Shielding Tape (1" x 15')
- 1Roll, Scotch™ 2228 Rubber Mastic Tape (2" x 10')
- 5Rolls, Armorcast™ Structural Material (4" x 15')
- 1Instruction Sheet
- 6Cold Shrink Adapter Tubes (3 white core, 3 red core)
- 6Copper Foil Tape (1/2" x 10")
- 10Gloves

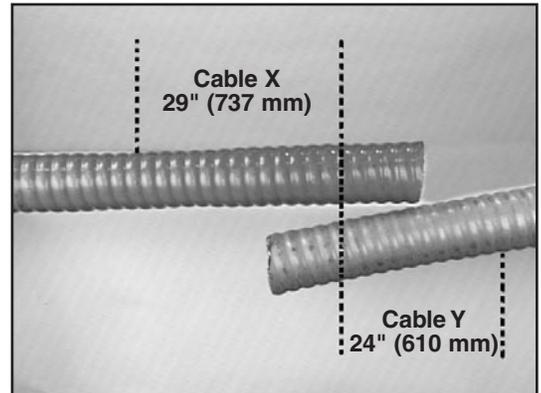
2.0 Prepare Cable

- 2.1 Prepare the cable according to your company's standard procedures. Allow cable ends to overlap as much as 10" (254 mm).

Remove 29" (737 mm) of cable jacket, plus half of the overlap from **Cable X**.

Remove 24" (610 mm) of cable jacket, plus half of the overlap from **Cable Y**.

Keep a 18" (457 mm) piece of cable jacket removed from **Cable X** and a 13" (330 mm) piece of jacket from **Cable Y** for use later in these instructions.

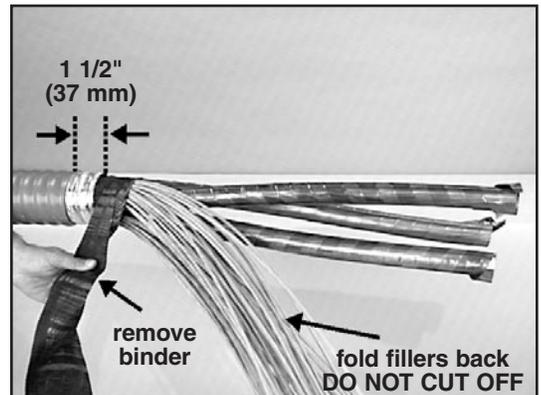


- 2.2 If cable is armored, remove cable armor leaving 1 1/2" (37 mm) armor exposed beyond jacket end.

Remove cable binder, if present, at the end of the jacket or armor and discard.

Fold cable fillers and ground wire(s) back over cable jacket end. Do not cut off.

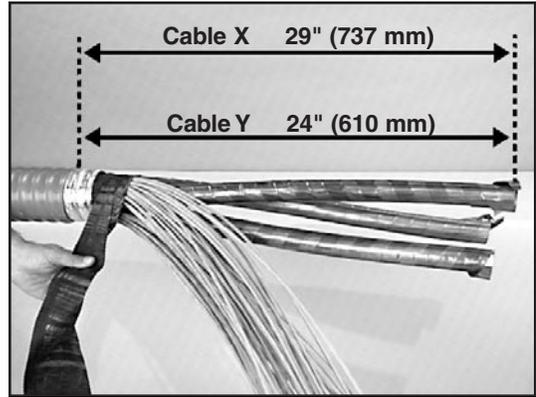
Temporarily hold the fillers and ground wire(s) back by banding them to the cable jacket using Scotch™ 33+ vinyl tape included in kit.



2.3 Cut the phase conductors to the appropriate length.

Conductors of **Cable X** should be 29" (737 mm) when measured from the cable jacket end or 27 1/2" (699 mm) when measured from end of the armor.

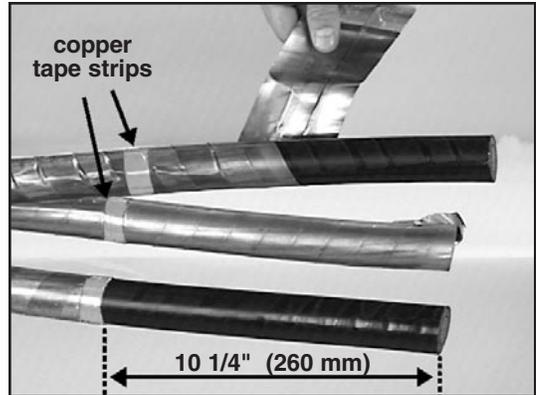
Conductors of **Cable Y** should be 24" (610 mm) when measured from the cable jacket end or 22 1/2" (572 mm) when measured from end of the armor.



2.4 Bind the metallic shields of both **Cable X** and **Cable Y** conductors with copper tape strip at a point 10 1/4" (260 mm) from the end of each conductor.

Remove the metallic shields to copper tape binding .

If the conductors are individually jacketed, remove the individual jackets a distance of 13 3/4" (349 mm) from the end of each conductor.



2.5 Remove cable semi-conductive insulation shields from conductors of both **Cable X** and **Cable Y** a distance of 7 1/4" (185 mm) from the end of each conductor.

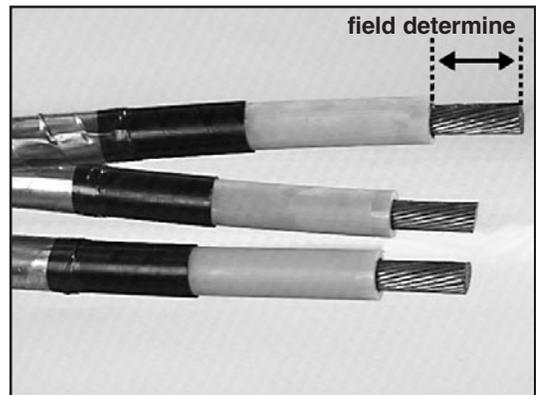
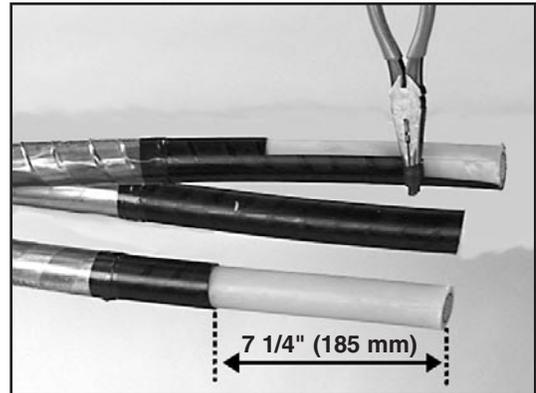
Note: *Cables must be within Insulation OD Range of splice kit.*

2.6 Remove cable insulation from conductors ends of both **Cable X** and **Cable Y**.

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 2 1/4" (57 mm) from conductor end.

Do not install connectors now.

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

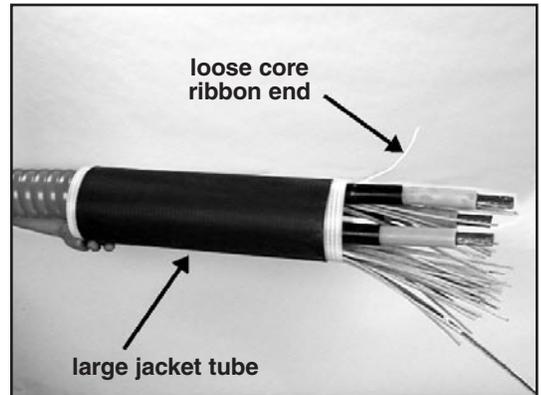


Aluminum Connector Size	Typical Growth allowance per end
1 AWG	1/8" (3 mm)
1/0 AWG	1/8" (3 mm)
2/0 AWG	1/8" (3 mm)
3/0 AWG	1/8" (3 mm)
4/0 AWG	1/4" (6 mm)
250 kcmil	1/4" (6 mm)

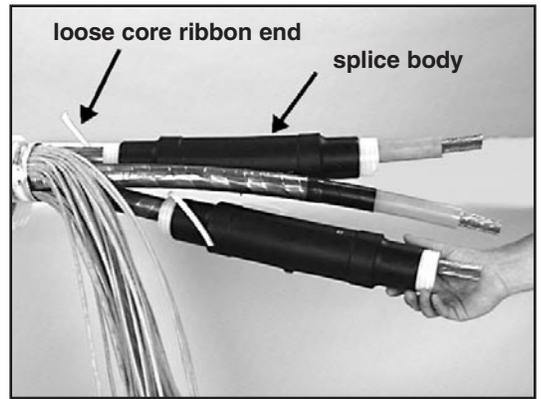
Notes: 1. Copper connectors do not require a length change allowance.
2. Maximum aluminum connector crimped length allowed is 4.50" (114 mm).

3.0 Place Components on Cable

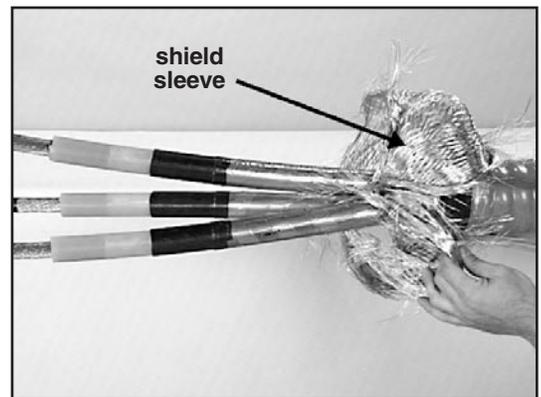
- 3.1 Slide one large cold shrink jacket tube onto **Cable X** and one onto **Cable Y** with the loose core ribbon ends going on the cable last, extending toward the cable ends.



- 3.2 Slide a cold shrink splice body onto each conductor of **Cable X** with the loose core ribbon end going on the cable first, away from cable end.

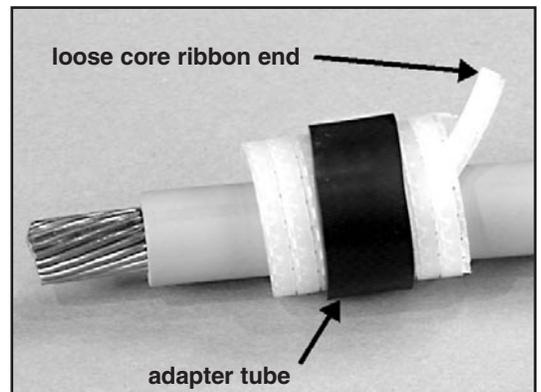


- 3.3 Expand metallic shield sleeves and slide one onto each conductor of **Cable Y**. Compress the ends of each shield sleeve together next to the cable armor or jacket end, away from the prepared conductor ends.



- 3.4 **For 1 and 1/0 AWG copper connectors or connectors with an O.D. between 0.46–0.60" (11,7–15,2 mm):** Slide the cold shrink adapter tube with the **RED CORE** onto the insulation with the loose core ribbon end going on first, away from the cable end.

For 2/0 AWG through 250 kcmil copper connectors, 1 through 3/0 AWG aluminum connectors, or connectors with an O.D. between 0.53–0.84" (13,5–21,3 mm): Slide the cold shrink adapter tube with the **WHITE CORE** onto the insulation with the loose core ribbon end going on first, away from the cable end.

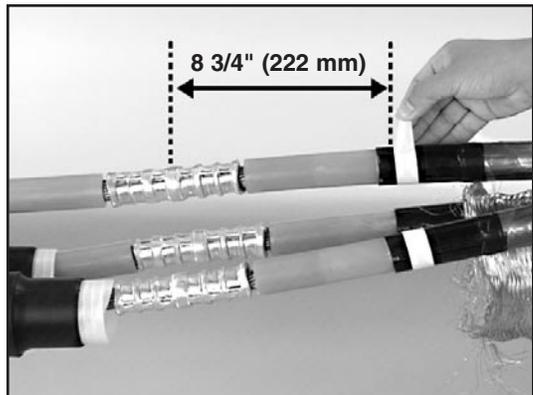


4.0 Install Splice

- 4.1 Install connectors. See Table on front cover of this instruction for proper connector dimensions. Crimp connectors per recommendations from connector manufacturer. (For standard 3M™ connectors, refer to table at the end of this instruction for crimping information).

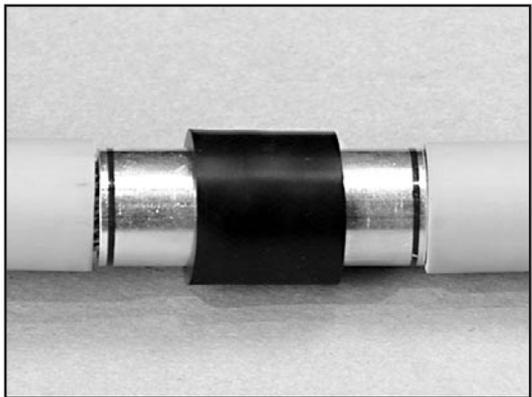


- 4.2 Apply a tape marker to cable semi-con insulation shields on **Cable Y** (cable side which does not contain splice body) **at a distance of 8 3/4" (222 mm) measured from the CENTER of connectors.**



- 4.3 **If using cold shrink adapter tube:**

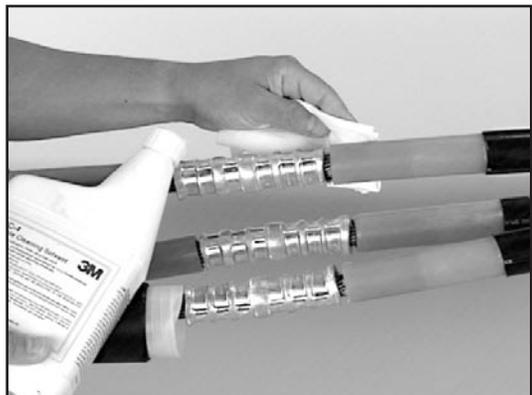
Position cold shrink adapter tube **over center of connector**. Shrink the adapter near center of connector by pulling and unwinding the loose core ribbon end in a counter-clockwise direction.



- 4.4 Remove any excess oxidation inhibitor from connector ends if aluminum connectors are used.

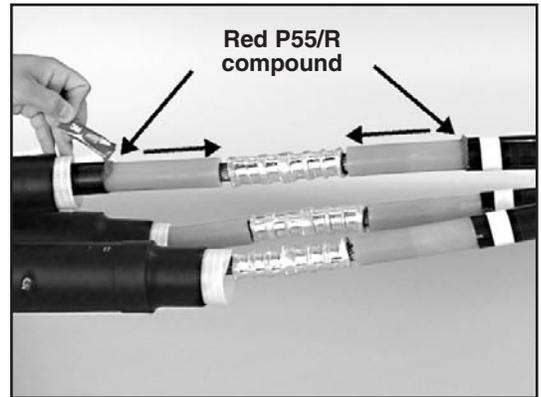
Clean cable using standard practice:

- Do not use solvent or abrasive on cable semi-conductive insulation shield.
- If abrasive is used on cable insulation, do not reduce diameter below the 0.84" (21,3 mm) minimum specified for the splice.



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

Note: *DO NOT use silicone grease.*

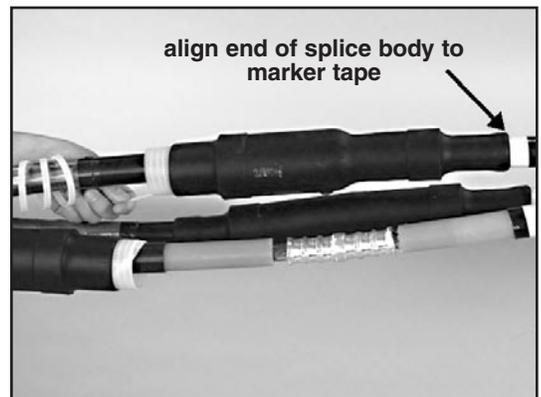


- 4.6 Individually, position each splice body over the connector area and align the leading end of the rubber with the center of the marker tape.

Slowly begin to remove the inner support core by pulling while unwinding the loose ribbon end in a counterclockwise direction, allowing only 1/4" (6 mm) of the splice to shrink onto the marker tape.

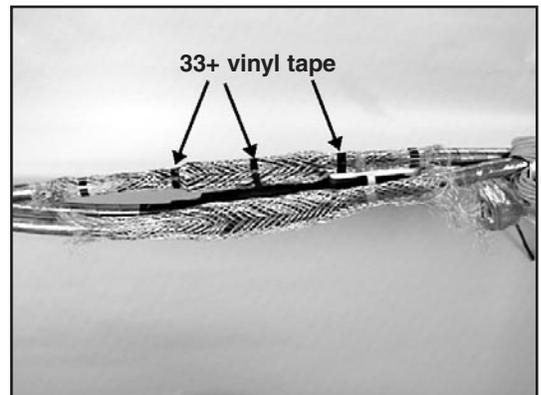
Carefully slide the splice body off the marker tape by pulling and twisting until the entire marker tape is exposed. Continue removing the core to complete splice body installation.

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.*

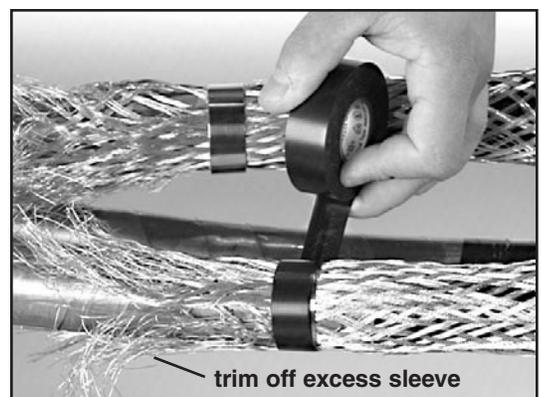
- 4.7 Center the metallic shield sleeves over the splice bodies. Hand tighten sleeves from center of splices outward in both directions. Secure sleeves by applying 33+ vinyl tape bands at splice center and at each end.



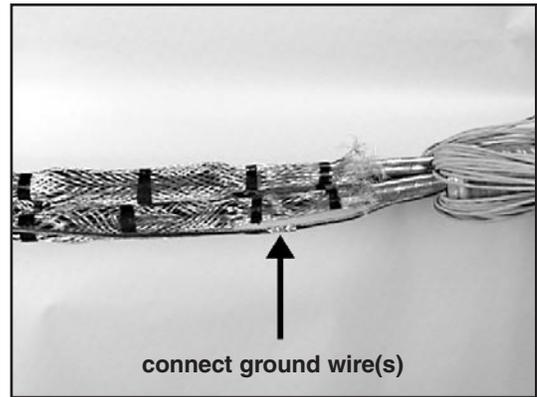
- 4.8 Connect sleeve ends to the cable metallic shield with a small constant force spring. Install each spring by unwrapping and rewrapping the spring around itself over the shield sleeve end and cable metallic shield.

Trim off excess shield sleeve braid material.

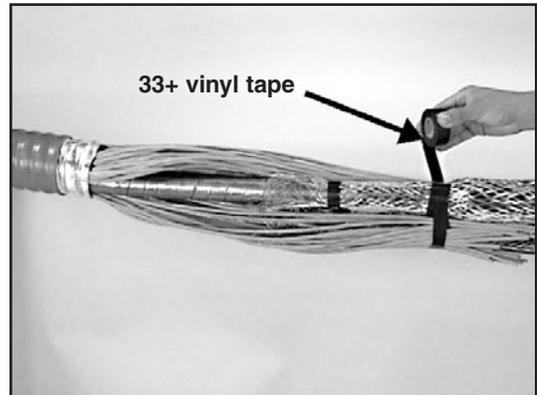
Cover springs and trimmed shield sleeve ends with one half-lapped layer of vinyl tape.



- 4.9 Connect the ground wire(s) from **Cable X** to the ground wire(s) from **Cable Y**. Make the connection away from the splice bodies.

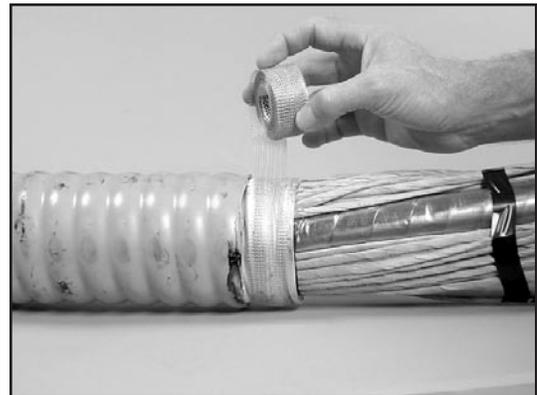


- 4.10 Unfold the cable fillers and reestablish their lay between the cable conductors. Hold the fillers in place with a band of 33+ vinyl tape.



5.0 Install Armor Continuity (If Cable is Armored)

- 5.1 Apply multiple wraps of Scotch™ 24 shielding tape around the exposed armor on both **Cable X** and **Cable Y** to fill a valley in the corrugated armor. Half hitch to tie off.



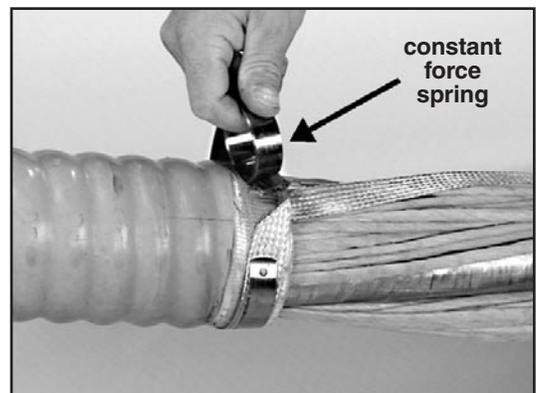
- 5.2 Wrap an end of the ground continuity braid around exposed armor and applied 24 tape on one cable end.

Wrap one wrap only and fold the braid at 90° with the long braid end extending toward splice opening.

Install a large constant force spring around the braid wrapped on the armor. Spiral wrap the braid around the splice opening to the other cable armor.

Fold the braid 90° and wrap braid end around armor. Wrap braid end for one wrap only. Cut off and discard excess braid.

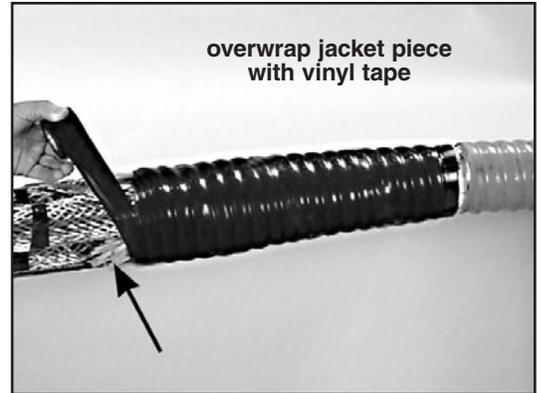
Connect braid by installing other constant force spring. Overwrap each spring with 33+ tape.



6.0 Install Splice Jacket

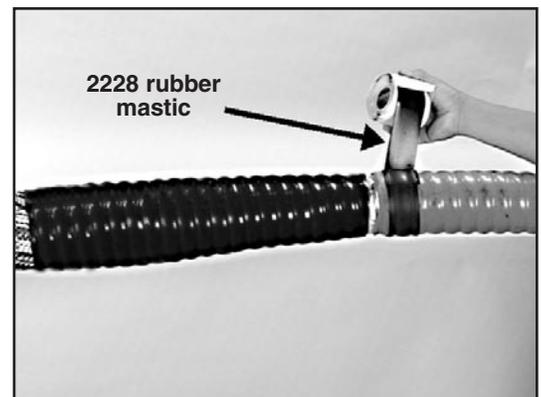
- 6.1 Over wrap the exposed conductors on each side of splice bodies with jacket pieces saved from step 2.1.

Bind the cable jacket pieces in place with one half-lapped layer of Scotch™ 88, 1 1/2" wide tape.



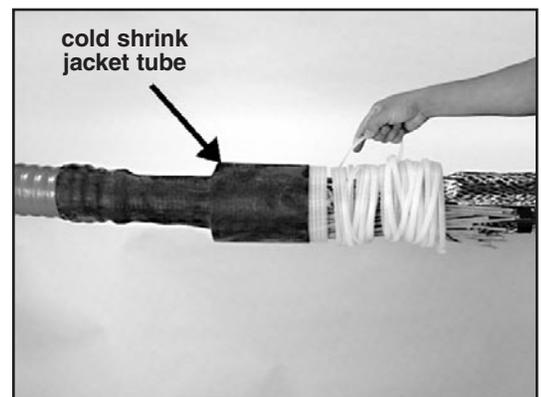
- 6.2 At both ends of splice, apply four wraps of 2228 rubber mastic, around the cable jacket 1/2" from jacket ends.

Stretch the rubber mastic to three-fourth original width when applying.

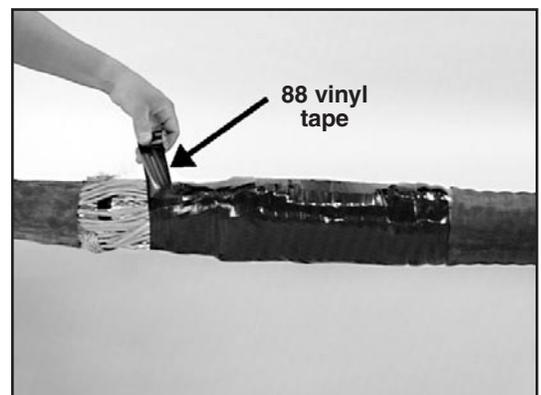


- 6.3 Install a cold shrink jacket tube on each cable with the leading end just covering the 2228 mastic and the tube extending toward the splice bodies.

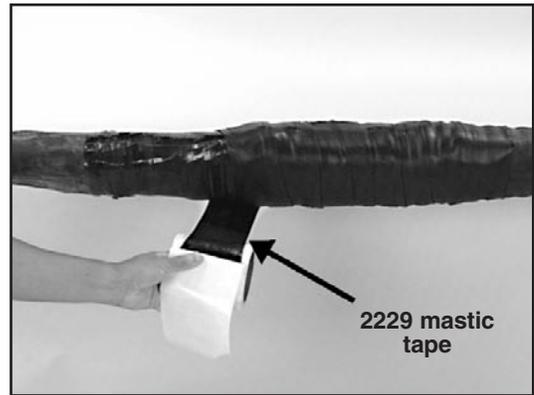
Pull while unwinding the loose core ribbon end in a counterclockwise direction to install jacket tube.



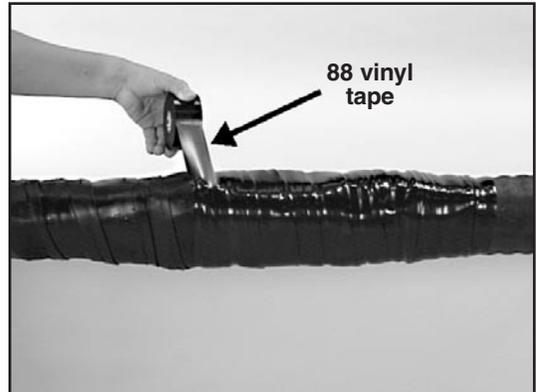
- 6.4 Apply one half lapped layer of 88 tape over the unjacketed area in splice center.



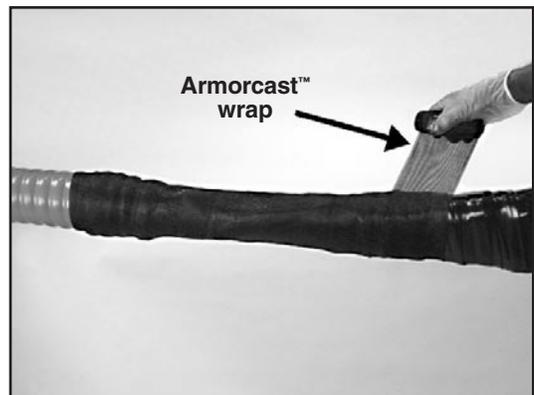
6.5 Apply two half-lapped layers of 4" wide 2229 tape over applied vinyl tape in splice center. Overlap ends of Cold Shrink jacket tubes 2" (51 mm).



6.6 Cover the applied 2229 mastic with two half lapped layers of 88 tape.



6.7 Overwrap the entire splice with a minimum of two half lapped layers of Armorcast™ wrap. Tear open the top end of the foil Armorcast material container and fill foil container half full with water. Squeeze the container four or five times allowing the water to penetrate the roll. Pour out water, remove roll from foil container and immediately apply to splice area.



Bind the final wrap in place with vinyl tape.

Note: *Wear rubber gloves provided when handling Armorcast™ Wrap. The resin contains a black die that will stain human skin.*

Armorcast™ Wrap can be applied first and then sprayed with water to activate the curing system. It will also cure from moisture in the air in humid conditions.

6.8 Splice is complete.



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

3M™ Connector Number	Conductor Size (AWG or kcmil)	Burndy					Thomas & Betts Corp.				Square D Co. Anderson Div.	Kearney
		MD6	MY29	Y34A	Y35, Y39 Y45*, Y46*	Y1000**	TBM 5	TBM 8	TBM 12	TBM 15	VC6-3** VC6-FT**	Type O
10004 (Cu)	1	—	1 AWG (1)	A1CR (1)	U1CRT (2)	—	Green (1)	Green (1)	—	37 (1)	(1)	—
20004 (Al/Cu)	1	W163 (3)	1 AWG (1)	A1CAB (1)	U1CART (1)	1	Gold (2)	Gold (2)	—	45 (1)	(1)	1/2 (3)
CI-21 (Al/Cu)	1	BG (3)	—	U243 (1)	U25ART (1)	—	—	Olive (2)	—	50 (1)	(1)	5/8-1 (3)
10005 (Cu)	1/0	W163 (2)	1/0 (1)	A25R (1)	U25RT (1)	—	Pink (2)	Pink (2)	—	42 (2)	(1)	—
20005 (Al/Cu)	1/0	W241 (2)	1/0 (1)	A25AR (1)	U25ART (1)	(1)	Tan (2)	Tan (2)	—	50 (1)	(1)	5/8-1 (3)
CI-1/0 (Al/Cu)	1/0	BG (3)	—	U243 (1)	U25ART (1)	—	—	Olive (2)	—	50 (1)	(1)	5/8-1 (3)
10006 (Cu)	2/0	W241 (2)	2/0 (1)	A26R (1)	U26RT (2)	—	Black (2)	Black (2)	—	45 (1)	(1)	—
20006 (Al/Cu)	2/0	BG (4)	2/0 (1)	A26AR (2)	U26ART (2)	(1)	Olive (2)	Olive (2)	—	54H (2)	(2)	5/8-1 (3)
11006 (Cu)	2/0	W241 (3)	2/0 (2)	A26R (2)	U26RT (2)	—	Black (3)	Black (3)	—	45 (2)	(2)	—
CI-2/0 (Al/Cu)	2/0	W249 (3)	—	—	U28ART (2)	—	—	Blue (4)	—	76 (2)	(2)	840 (4)
10007 (Cu)	3/0	W243 (2)	3/0 (1)	A27R (1)	U27RT (2)	—	Orange (2)	Orange (2)	—	50 (1)	(1)	—
20007 (Al/Cu)	3/0	W166 (4)	3/0 (1)	—	U27ART (2)	(1)	Ruby (2)	Ruby (2)	—	60 (2)	(2)	737 (3)
11007 (Cu)	3/0	W243 (3)	3/0 (2)	A27R (2)	U27RT (3)	—	Orange (3)	Orange (3)	—	50 (2)	(2)	—
CI-3/0 (Al/Cu)	3/0	W249 (3)	—	—	U28ART (2)	—	—	Blue (4)	—	76 (2)	(2)	840 (4)
10008 (Cu)	4/0	BG (3)	4/0 (1)	A28R (2)	U28RT (2)	—	Purple (2)	Purple (2)	—	54H (2)	(2)	—
20008 (Al/Cu)	4/0	W660 (4)	4/0 (2)	A28AR (2)	U28ART (2)	(1)	—	White (4)	—	66 (4)	(2)	840 (4)
11008 (Cu)	4/0	BG (4)	4/0 (2)	A28R (3)	U28RT (3)	—	Purple (3)	Purple (3)	—	54H (3)	(3)	—
CI-4/0 (Al/Cu)	4/0	W249 (3)	—	—	U28ART (2)	—	—	Blue (4)	—	76 (2)	(2)	840 (4)
10009 (Cu)	250	W166 (3)	250 (1)	A29R (2)	U29RT (2)	—	Yellow (2)	Yellow (2)	—	62 (2)	(2)	—
20009 (Al/Cu)	250	W249 (3)	—	A29AR (2)	U29ART (2)	(1)	—	—	71H (2)	71H (2)	(3)	—
11009 (Cu)	250	W166 (4)	250 (2)	A29R (3)	U29RT (3)	—	Yellow (3)	Yellow (3)	—	62 (3)	(3)	—
CI-250 (Al/Cu)	250	—	—	—	U31ART (2)	—	—	—	87H (2)	87H (2)	(2)	—

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

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

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Note: The core material being removed from the Splice Body, Jacket Tubes and adapter 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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