BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G50.681.3
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AT&TCo Standard

INSULATING JOINTS
INSTALLING CAPACITORS ON POLYETHYLENE SHEATH CABLES

Contents **Page**

1. GENERAL

1.01 This section describes the method of bringing out insulated wire leads from each side of an insulating joint in polyethylene sheath cable such as, alpeth, stalpeth, PAP or PASP sheath cable. It also covers the method of installing the KS-14595 Capacitor which replaces the KS-6847 Capacitor.

1.02 The method of making straight insulating joints in lead or polyethylene sheath cable is covered in other sections of the Practices. On polyethylene sheath cables up to and including 1.6-inch outside diameter, insulating joints may be made with 13A or 14A Splice Cases.

2. MATERIALS AND TOOLS

2.01 The materials listed below are required in addition to the materials usually carried by splicers:

Clamp, Sealing: For use on cables to be maintained under continuous pressure. Four required at each insulating joint.

Cap, Valve, M:	Two required for each joint.
Flange, Pressure Testing, F:	Two required for each joint.
Tape, DR, Two-Inch:	Used for wrapping joint.
Tape, B Glass:	Glass-cloth tape. Used for wrapping joint. Formerly No. 27 Scotch Electrical Tape.
Tape, D Vinyl:	For wrapping aerial joints.
Valve, Pressure Testing, F:	Two required for each joint.
Wire, HD:	14-gauge insulated copper wire for capacitor leads.

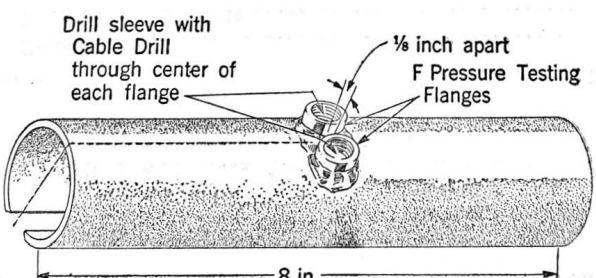
2.02 The tools listed below are required in addition to the tools usually carried by splicers:

Drill, Twist, No. 9
Drill, Twist, No. 10

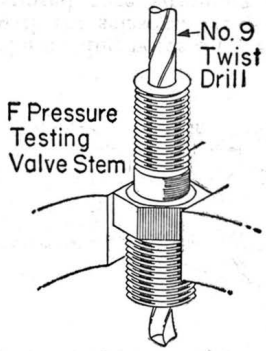
3. PREPARATION OF LEAD SLEEVE AND VALVE PARTS

3.01 Prepare a split lead sleeve 8 inches in length and the next size larger in diameter than the cable. Bevel the split edges to 1/2 the sleeve thickness and remove the identification ridges from the sleeve.

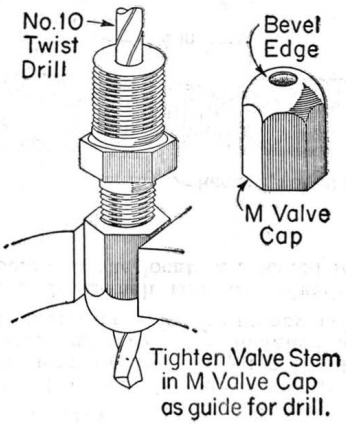
3.02 Mark the center line of the sleeve opposite the split edges. Install two F pressure testing flanges in the usual manner as indicated below. Drill holes through the sleeve inside each flange with a cable drill. Bevel the holes inside the sleeve.



3.03 Take two F pressure testing valves and remove the cores. Prepare the valve stems for the wire leads from inside the sleeve by enlarging the hole in the valve stem with a No. 9 twist drill as shown below.



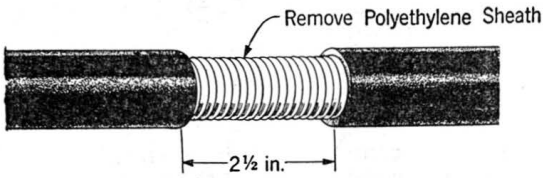
3.04 Take two M valve caps and remove the sealing gasket from each cap. Take each cap in turn and thread a prepared valve stem into the cap. Tighten the stem in the cap and using the stem as a guide, as shown below, drill through the top of the cap with a No. 10 twist drill. Bevel the outer edge of the drilled hole slightly.



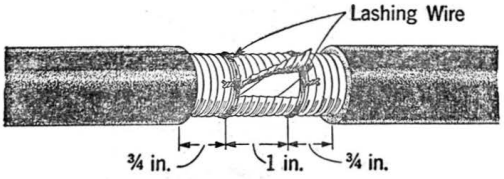
4. INSULATING JOINT

4.01 The method of making an insulating joint outlined below is used on alpeth, stalpeth, PAP, or PASP sheath cable where capacitors are installed across insulating joints to reduce carrier or voice-frequency noise.

4.02 Remove a 2-1/2-inch ring of polyethylene sheath as shown below at the location selected for the insulating joint.

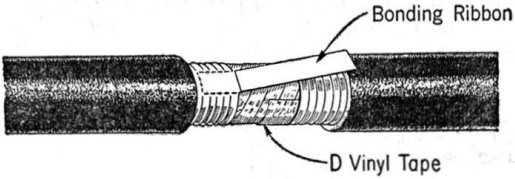


4.03 Place two turns of lashing wire 3/4 inch from each end of the opening, as shown below. Cut the terne plate (if present) with the chipping knife between the lashings, taking care not to damage the underlying core wrapper. If only aluminum is present, it can be cut with the scissors. Grip the edge of the terne plate and aluminum with the pliers and tear off to the lashing wires, making smooth flared ends.

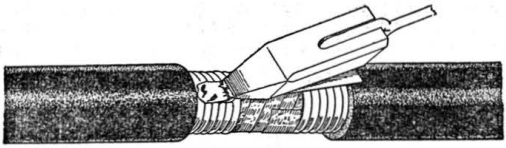


4.04 Take off the lashing wires and remove any sharp edges or burrs with the scissors. Wrap two layers of D Vinyl Tape over the exposed core wrapping paper, or inner polyethylene sheath in the case of PAP or PASP sheath cable.

4.05 Prepare each end for tinning by inserting a strip of bonding ribbon between the core wrapper and the aluminum as shown below. On PAP or PASP sheath cable and PIC cable cover the side of the piece of bonding ribbon with a strip of B Paper Tape before insertion to reduce heat transfer. With the scissors smooth out the corrugations over the bonding ribbon.



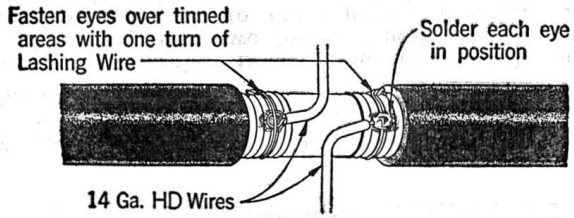
4.06 In alpeth or PAP cable, clean the aluminum with the carding brush, drop molten aluminum solder on the cleaned area and tin the surface by rubbing with the soldering copper as shown below. Complete the tinning by applying a small quantity of rosin core solder to the surface, and remove the bonding ribbon.



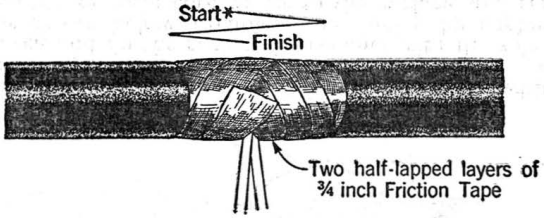
4.07 In stalpeth or PASP cable, the terne plate can be tinned using stearine core solder only. Then remove the bonding ribbon.

4.08 If the capacitor is to be mounted on the finished insulating joint, two 10-inch lengths of HD wire are required for the leads to the capacitor terminals. Longer lengths of HD wire are required if the capacitor is not mounted on the insulating joint. Remove one inch of the insulation and clean the end, then form it into a small eye. Fasten the eye on the tinned area of the terne plate or

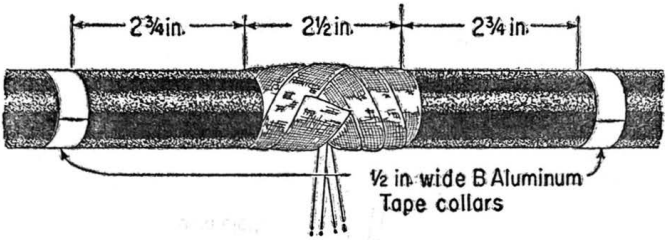
aluminum with one turn of lashing wire as shown below. Identify one of the leads with a small tag marked, for example, "Right Wire."



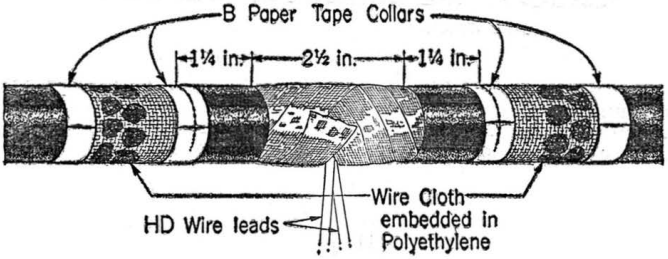
4.09 Solder each eye in position. After the solder has cooled trim off any sharp points of solder. Position the leads to correspond to the openings in the flanges on the sleeve. Wrap the opening in the sheath with two half-lapped layers of friction tape, taking care not to disturb the leads as shown below.



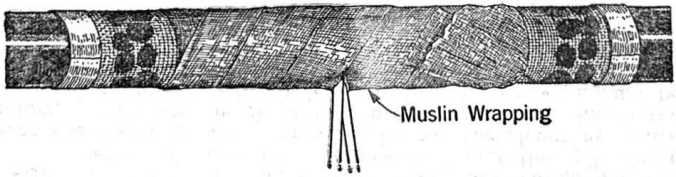
4.10 Cut two 1/2-inch wide pieces of B Aluminum Tape long enough to encircle the cable. These prevent the polyethylene from melting and oozing into the wire cloth mesh when the copper is applied in soldering the sleeve to the wire cloth. Position them as shown.



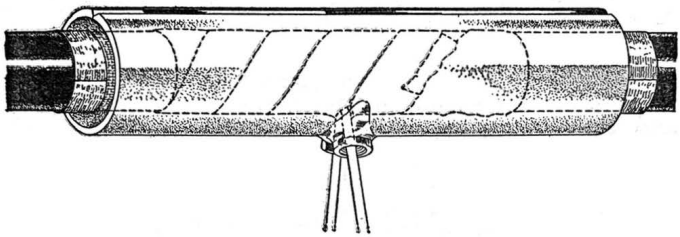
4.11 Then place the lengths of wire cloth over the B Aluminum Tape at each side of the opening as shown below. Hold the wire cloth in position with B Paper Tape. Embed the wire cloth in the polyethylene jacket in the usual manner.



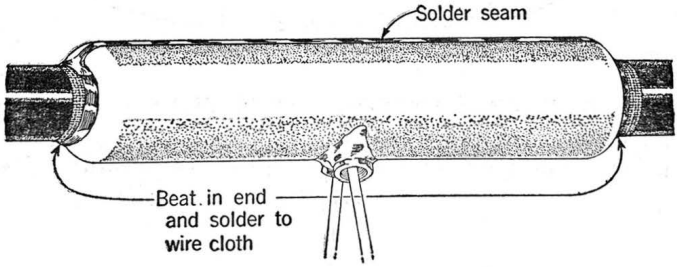
4.12 Wrap the sheath and the opening between the wire screen cloths with muslin to protect the polyethylene while the seam is being soldered.



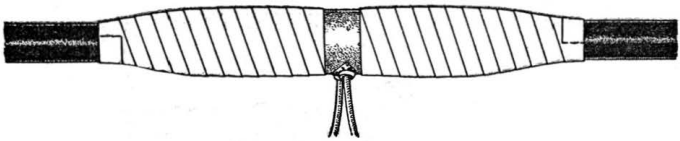
4.13 Draw the HD wire leads through the F flange openings before placing the split sleeve. Center the split sleeve over the opening in the cable, and close the sleeve as shown below, taking up the slack in the HD wire leads inside the sleeve. The length of the leads inside the sleeve should be kept to a minimum.



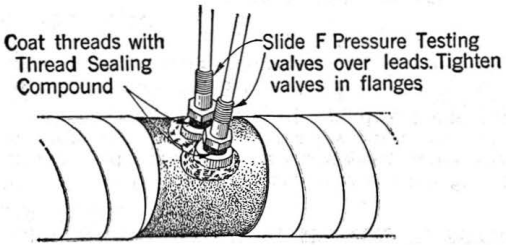
4.14 Run the solder seam, beat in the ends of the sleeve over the wire screen cloth and remove the tape collars. Then solder the sleeve to the wire cloth as far around the cable as practicable.



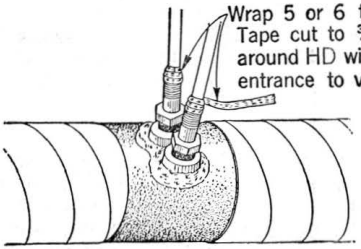
4.15 Complete wrapping both ends of the insulating joint with DR Tape, B Aluminum Tape and the desired outer covering as covered in Section G50.679.3 or G50.679.8.



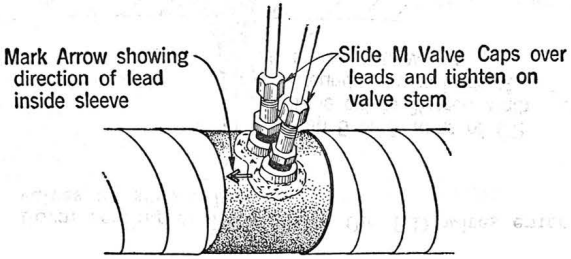
4.16 Remove the tag identifying the direction of one lead, place the prepared F pressure testing valves as indicated below, then replace the identifying tag.



4.17 Form sealing gaskets where the HD wires enter the valves as shown below.



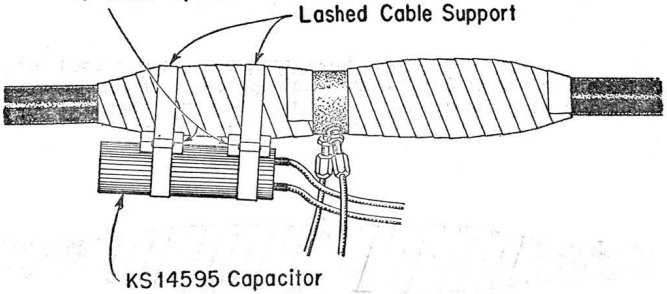
4.18 After marking the direction of one lead on the sleeve, remove the identifying tag. Slide the prepared M valve caps over each HD wire lead and work the cap over the DR tape wrapping as shown below. Tighten the cap a few turns on the valve stem with a wrench.



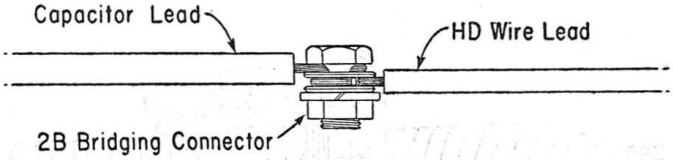
5. INSULATING JOINT WITH KS-14595 ELECTROLYTIC CAPACITOR

5.01 The KS-14595 Capacitor replaces the KS-6847 Capacitor and is used **to reduce voice-frequency noise** at insulating joints since the capacitor provides a low impedance path across the joint while blocking the passage of direct current.

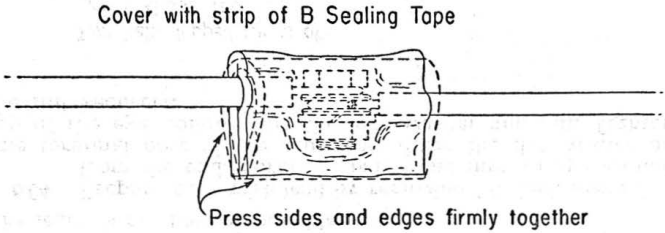
5.02 Fasten the KS-14595 Capacitor on the insulating joint with lashed cable supports and C cable spacers as shown.



5.03 Connect the HD wire leads to the KS-14595 Capacitor leads with 2B Bridging Connectors. The total length of lead should be as short as practical without placing the leads under tension.

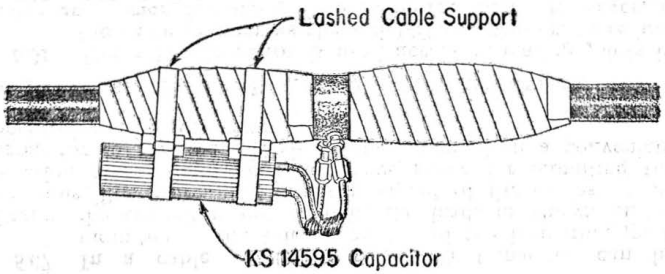


5.04 Cover the 2B Bridging Connector and the insulated leads on each side with B Sealing Tape.



5.05 Wrap the covered joints with D Vinyl Tape.

5.06 The completed installation is shown.



5.07 In a cable vault the KS-14595 Capacitor can be mounted at the side or on top of the insulating joint. Fasten the capacitor and connect the leads as shown in the previous illustration. If the arrangement of the cables or the position of the joint does not leave space for mounting the capacitor in this way, it should be mounted in a convenient position on the ironwork.

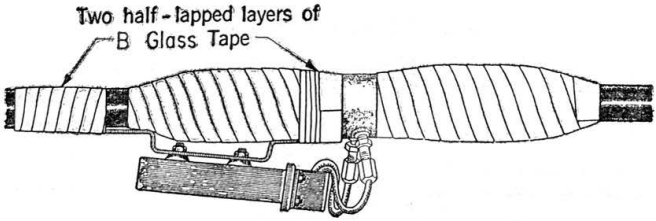
6. INSULATING JOINT WITH 304A CAPACITOR

6.01 The 304A Capacitor is used across insulating joints in the same manner as the KS-14595 Capacitor, **to reduce noise on carrier frequency circuits** in the cable. However, if a KS-14595 Capacitor has already been installed across the insulating joint for voice circuits in the cable, this capacitor will also serve for carrier purposes if the leads are short and close together. In this event, add the 304A Capacitor only if specified by the engineer.

6.02 Before installing the capacitor, apply two coats of No. 2 Asphalt Paint to the bracket, terminal guard, and entire surface of the capacitor, except the terminal lugs.

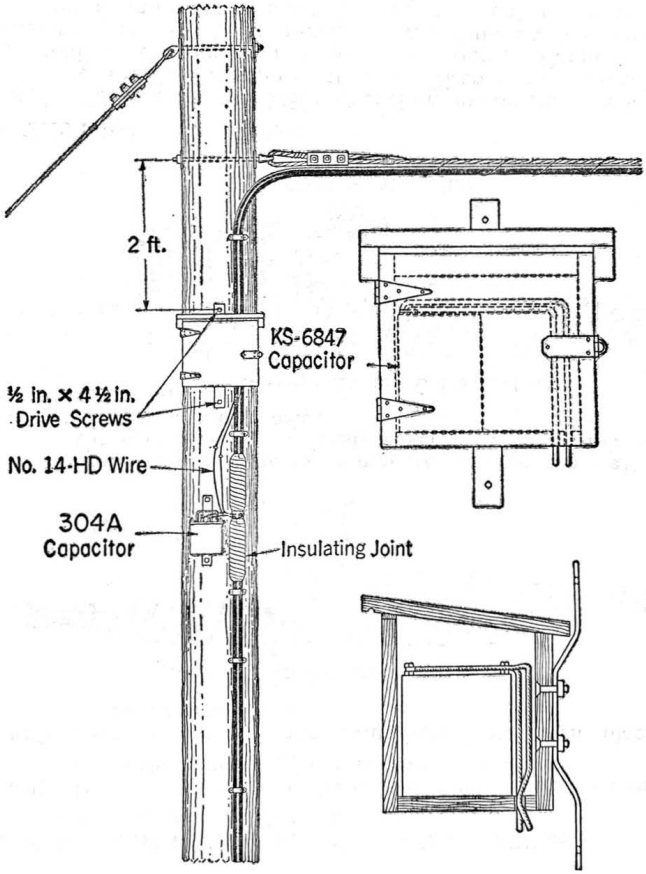
6.03 When the insulating joint is made in a horizontal section of the cable, attach the capacitor underneath the insulating joint with lashed cable supports. When the joint is made in a vertical run of cable on a pole, attach the capacitor to the pole with two 1-1/2-inch No. 14 R.H. galvanized wood screws. Locate the capacitor so that the combined length of the leads is as short as possible.

6.04 Prepare each wire lead by removing 5/8-inch insulation from the end. Form the bared end into an eye around one terminal post of the capacitor. Place the flat washer on top of the eye, followed by the lock washer and nut. Tighten the nut securely.



7. SUPERSEDED CAPACITORS

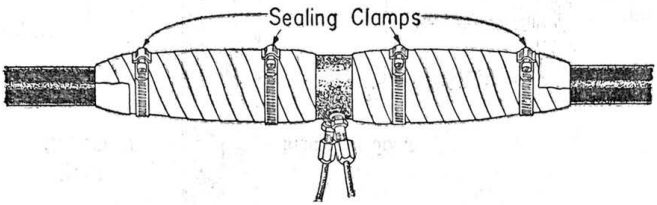
7.01 Existing KS-6847 Capacitors have been mounted in a small wooden box on the pole, as shown below. HD wire connects the capacitor across the insulating joint. The mounting of the 304A Capacitor on the pole is also shown. The bridged connections should be soldered and covered with DR Tape, then D Vinyl Tape.



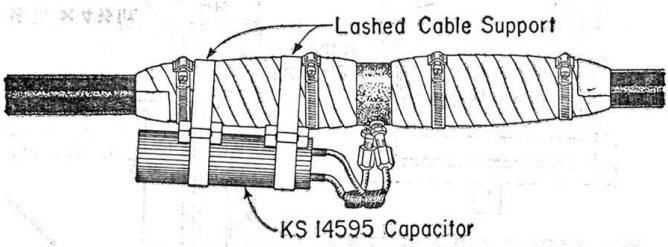
8. INSTALLING CAPACITORS—CABLE UNDER CONTINUOUS PRESSURE

8.01 If the cable is to be placed under continuous pressure, make the insulating joint as covered in Part 4.

8.02 After the outer tape wrappings have been placed, install Sealing Clamps.



8.03 If the capacitor is to be mounted on the cable attach the capacitor as previously covered in Paragraph 5.02. The installation is shown below.



9. TESTING CAPACITORS

9.01 To test the KS-14595 Capacitor, disconnect the leads at the 2B Bridging Connectors. Discharge the capacitor by holding the bare ends together briefly. Connect the capacitor leads to the terminals of an ohmmeter. A capacitor in good condition will show a temporary deflection of the needle while the capacitor is charging and then return to infinity. An open capacitor will show a very high or infinite resistance. If it shows a low resistance it is partially or completely shorted. Either open or shorted capacitors should be replaced.

9.02 The 304A Capacitor or other types are tested in the same manner as above except that the leads are removed at the binding posts.