# K AND B SPLICE CLOSURE
# DESCRIPTION AND INSTALLATION

CONTENTS PAGE



## 1. GENERAL

1.01 This section covers the description and installation of the K&B Splice Closures for use on plastic and lead sheath cables in central office vault and subscriber buildings.

1.02 This Section is issued to:

- Update tables to include additional closures and caps
- Provide a method of closure support
- Revise grounding requirements
- Provide a method of sealing split closures and end caps
- Update end cap dimensions
- Revise flash testing procedures
- Revise wrapping procedure
- Provide a method of sealing split closures and end caps
- Provide a method of rehabilitation of existing tip splices

1.03 The closures are designed to withstand vault flooding and provide a waterproof covering for splices not subjected to continuous water submersion. Closures are airtight and fire retardant when properly installed.

1.04 Do not use these closures at the following locations:

(a) Where the temperature may exceed 150° F.

(b) To enclose a splice in an exposed building entrance cable containing 400 pair or less. These smaller cables must be enclosed in a metallic splice case. This requirement is to provide a safer closure around the cable pairs that could carry excessive current under power conditions. Cables larger than 400 pairs are judged to contain sufficient copper to act as a "heat sink" under power fault conditions permitting use of non-metallic splice cases.

(c) In manholes or other locations subject to long term flooding.

1.05 These closures provide adequate space for splicing a cable using any of the approved wire joining methods covered in the 632 Division of the Practices. The closures are available for use as in-line or butt type configurations as appropriate.

1.06 Open splices should not be left unattended. If the permanent closure is not to be installed before leaving the job, it will be necessary to protect the splice using AT-8907B Cable Splice Wrap and KS-21822L1 Temporary Splice Cover as outlined in Section 632-490-200.

## 2. DESCRIPTION

2.01 The K&B Splice Closure (Figure 1) is available in the sizes listed in Table A. Each closure consists of the following components:

One (1) solid or split sleeve

One (1) collared end cap

One (1) multiple end cap & cable lubricant

Stainless steel clamps as required

NOTE: The KB2-100-2, KB3-175-1, and KB4-175-1 or 2 closures consist of two collared end caps only (no multiple caps or cable lubricant).

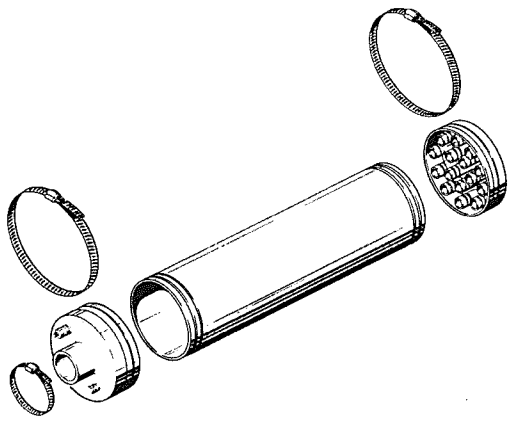


Figure 1. K&B Splice Closure

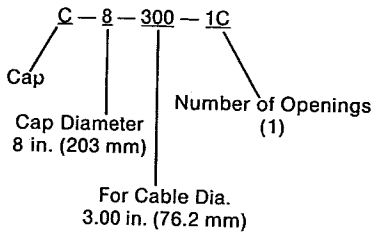
SLEEVES

2.02 The sleeves are fire resistant PVC cylinders available either solid or split. When split, a tongue and groove helps align the edges when the sleeve is closed. The split sleeve is used primarily to enclose splices on through or uncut cables; whereas the solid sleeves are used primarily for straight splices. Whenever possible, a solid sleeve is recommended. Codes for each sleeve are listed in Table A.

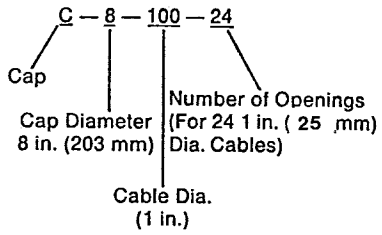
END CAPS

2.03 There are several different fire resistant end caps for each size sleeve (Table A).

(a) Collared end caps are for main cables and are coded as listed in Table A. Collared caps may be ordered split. The diameter of the main cable should be a maximum of equal to and a minimum of .25 inches smaller than the diameter of the collared end cap opening.

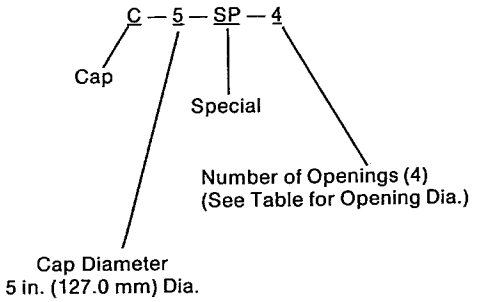



(b) Multiple opening end caps are for tip cables and are coded as listed in Tables A and E. Multiple end caps have two different tapered openings, a 100 which fits tip cable from .88 - 1.06 inch and a 130 which fits 1.15 - 1.30 tip cables. Following is an explanation of the codes:




ESS cutover caps are designed for use with 10 inch K&B vault sleeves. The cap has a 3 inch collared feeder cable opening with 27 1 inch tip cable entries. Caps come split unless otherwise specified.

(c) Special end caps are used primarily for building cable splices. These caps are coded as listed in Table B. Following is an explanation of the codes:



# TABLE A

## K & B SPLICE CLOSURES

### K & B Closure Component Selector Guide

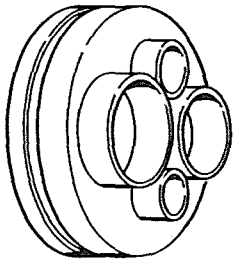
| CLOSURE CODE* | STANDARD COMPONENTS | | | | ACCESSORIES | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SLEEVES | | END CAPS | | CAPS | | | | | CLAMPS | |
| |  |  |  |  |  |  |  |  |  |  |  |
| | SOLID** Dia. Length | SPLIT** Dia. Length | COLLARED** | MULTIPLE | SPECIAL | BUTT | FLAT | MULTIPLE | PUDDLE | SLEEVE (two each) | COLLARED (one each) |
| KB2-100-2 | 2-24 | 2DS-24 | C2-2(two) | | | C2-2 | C2 | | | 2SS | |
| KB3-175-1 | 3-24 | 3DS-24 | C3-175-1C(two) | | C3-SP-3 | C3-3 | C3 | | | 3SS | 34CC |
| KB4-175-1 | 4-24 | 4DS-24 | C4-175-1C(two) | | C4-SP-4 | C4-175-2 | C4 | | | 4SS | 34CC |
| KB4-175-2 | 4-24 | 4DS-24 | C4-175-1C | C4-175-2 | | | | | | | |
| KB5-100-6 | 5-26 | 5DS-26 | C5-275-1C | C5-100-6 | C5-SP-4 | C5-4 | C5 | C5-100-6 | | 5SS | 59CC |
| KB5-130-6 | 5-26 | 5DS-26 | C5-275-1C | C5-130-6 | | | | C5-130-6 | | | |
| KB5-175-2 | 5-26 | 5DS-26 | C5-275-1C | C5-175-2 | | | | C5-175-2 | | | |
| KB6-100-9 | 6-26 | 6DS-26 | C6-275-1C | C6-100-9 | C6-SP-4 | | C6 | C6-100-9 | | 67SS | 59CC |
| KB6-130-9 | 6-26 | 6DS-26 | C6-275-1C | C6-130-9 | | | | C6-130-9 | | | |
| KB6-175-3 | 6-26 | 6DS-26 | C6-275-1C | C6-175-3 | | | | C6-175-3 | | | |
| KB7-100-15 | 7-26 | 7DS-26 | C7-275-1C | C7-100-15 | C7-SP-4 | | C7 | C7-100-15 | C7-5 | 67SS | 59CC |
| KB7-175-5 | 7-26 | 7DS-26 | C7-275-1C | C7-175-5 | | | | C7-175-5 | | | |
| KB8-100-24 | 8-26 | 8DS-26 | C8-300-1C | C8-100-24 | | | | C8-100-24 | | 8SS | 59CC |

| CLOSURE CODE* | STANDARD COMPONENTS | | | | ACCESSORIES | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SLEEVES | | END CAPS | | CAPS | | | | | CLAMPS | |
| |  |  |  |  |  |  |  |  |  |  |  |
| | SOLID** Dia. Length | SPLIT** Dia. Length | COLLARED** | MULTIPLE | SPECIAL | BUTT | FLAT | MULTIPLE | PUDDLE | SLEEVE (two each) | COLLARED (one each) |
| KB8-130-18 | 8-26 | 8DS-26 | C8-300-1C | C8-130-18 | C8-SP-4 | | C8 | C8-130-18 | C8-7 | 8SS | 59CC |
| KB8-175-8 | 8-26 | 8DS-26 | C8-300-1C | C8-175-8 | | | | C8-175-8 | | | |
| KB9-100-27 | 9-26 | 9DS-26 | C9-300-1C | C9-100-27 | C9-SP-4 | C9-275-3 | C9 | C9-100-27 | C9-5 | 9-10SS | 59CC |
| KB9-130-24 | 9-26 | 9DS-26 | C9-300-1C | C9-130-24 | | | | C9-130-24 | | | |
| KB9-175-9 | 9-26 | 9DS-26 | C9-300-1C | C9-175-9 | | | | C9-175-9 | C9-7 | | |
| KB10-100-36 | 10-26 | 10DS-26 | C10-360-1C | C10-100-36 | C10-100-27/300 | | C10 | C10-100-36 | C10-8 | 9-10SS | 10-12CC |
| KB10-100-36L | 10-34 | 10DS-34 | C10-360-1C | C10-100-36 | | | | | | | |
| KB12-100-48 | 12-28 | 12SS-28*** | C12-390-1C | C12-100-48 | | | C12 | C12-100-48 | C12-8/6 | 12SS | 10-12CC |
| KB12-130-37 | 12-28 | 12SS-28*** | C12-390-1C | C12-130-37 | | | | C12-130-37 | | | |

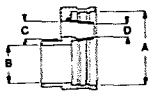
*If a split rather than a solid sleeve is required, note in the order by adding "S" to closure code. For example: when ordering 2 inch closure with split sleeve, use KBS2-100-2.
**Two clamps are included with solid sleeve order. Three clamps are included with split sleeve order. One clamp is included with collared end cap.
***The 12 inch split sleeve is single split, not double split. It is the only sleeve that uses an "H" strip.

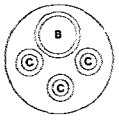
## TABLE B

### Special end caps

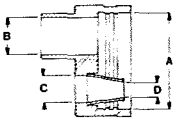


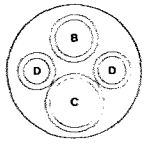

C3-SP-3



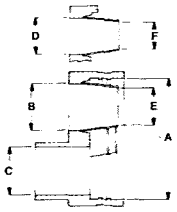



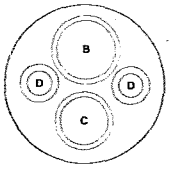

C4-SP-4



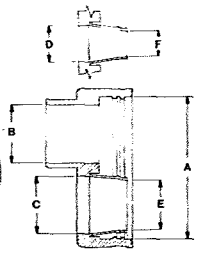



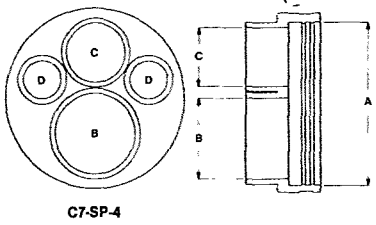

C5-SP-4



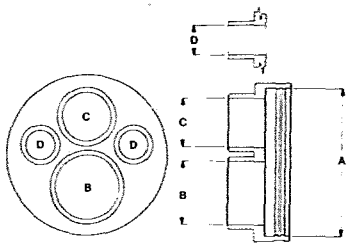




C6-SP-4

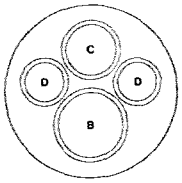


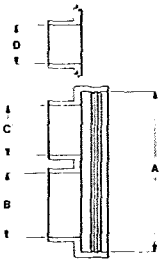




C7-SP-4




C8-SP-4



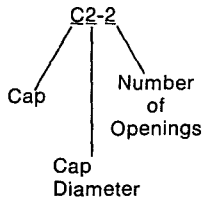

C9-SP-4

inches(mm)

| PART NUMBER | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| C3-SP-3 | 3.50(88.9) | 1.54(39.12) | 1.00(25.4) | .64(16.26)* | — | — |
| C4-SP-4 | 4.50(114.3) | 1.75(44.45) | 1.25(31.75) | .74(18.80)* | — | — |
| C5-SP-4 | 5.563(141.30) | 2.25(57.15) | 2.25(57.15) | 1.75(44.45) | 1.75(44.45)* | 1.25(31.75)* |
| C6-SP-4 | 6.625(168.28) | 2.75(67.31) | 2.65(69.85) | 1.75(44.45) | 2.31(58.67)* | 1.24(31.50)* |
| C7-SP-4 | 7.625(193.68) | 3.60(91.44) | 2.75(69.85) | 1.75(44.45) | — | — |
| C8-SP-4 | 8.625(219.08) | 3.60(91.44) | 2.75(69.85) | 1.75(44.45) | — | — |
| C9-SP-4 | 9.375(238.13) | 3.60(91.44) | 2.94(74.68) | 2.25(57.15) | — | — |

*Note: This is a rubber dimension. Minimum cable diameter must provide for .05" stretch.

(d) Five different butt caps provide butt splice protection for use in tight areas where normal configurations are not possible, and cables must enter and leave the closure at the same end. Used in conjunction with a flat cap, butt caps have from 2-6 cable entries, having the capability to handle a wide variety of tasks. Butt caps for butt splices are coded as listed in Table C and described as follows:




C2-2 A 2 inch cap with 2 stepped cable entries. The cap can be trimmed to fit cables from .24 inch (6.10 mm) diameter to .97 inch (24.64 mm) diameter.

C3-3 A 3 inch cap with 3 stepped cable entries. The cap can be trimmed from .25 inch (6.35 mm) diameter to 1.0 inch (25.4 mm) diameter.

**C4-175-2 A 4 inch cap with 2 collared openings. The openings have a fixed diameter of 1.75 inch (44.45 mm).**

C5-4 A 5 inch cap with 6 cable entries. The two collared 2.25 inch (57.15 mm) diameter openings are for main cables. Two additional 1.24 inch (31.50 mm) and 1.0 inch (25.4 mm) openings provide four branch cable entries.

C9-225-3 A 9 inch cap 3 collared openings of 2.75 inches (69.9 mm).

(e) Flat caps are for sealing one end of the K&B closure when a butt configuration is used. They are coded as listed in Table D.

(f) Puddle caps are used for closures and applications requiring the sealing of several different sized cables. The puddle cap is designed to accommodate a sealing tape collar installed around and between the cables for a tight fit. Applications would include vaults, building shafts and risers. They are coded as listed in Table D and described as follows:

C7-5 A 7 inch cap with one collared opening of 5 inch (12.7 mm) diameter.

C8-7 A 8 inch cap with one collared opening of 7 inch (193.68 mm) diameter.

C9-5 A 9 inch cap with one collared opening of 5 inch (127 mm) diameter.

C9-7 A 9 inch collared cap with one collared opening of 7 inch (177.8 mm) diameter.

C10-8 A 10 inch collared cap with one collared opening of 8 inch (203.2 mm) diameter.

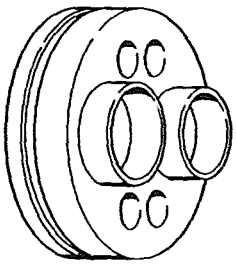
C12/8-6 A 12 inch stepped cap with one collared opening 5.92 inch (150.37 mm) and 7.88 inch (200.15 mm) diameters.

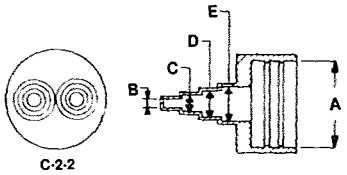
CLAMPS

2.04 Stainless steel clamps are furnished with each closure, these clamps are used to secure the end caps to the sleeve and main cable. Clamps for each closure are listed in Table A.

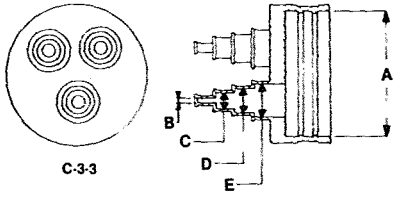
**TABLE C**

## Butt caps

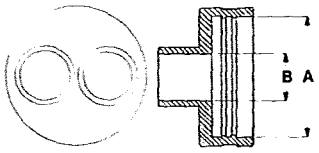




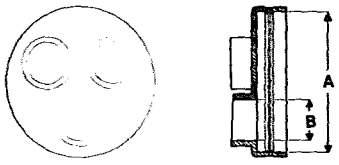

C-2-2



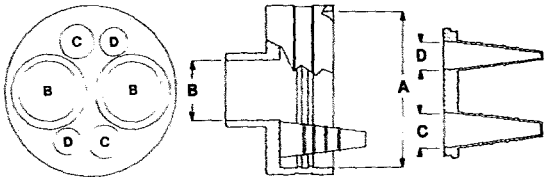

C-3-3




C4-175-2




C9-275-3



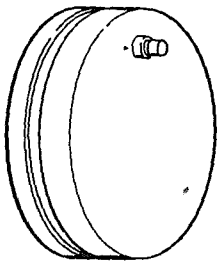

C5-4

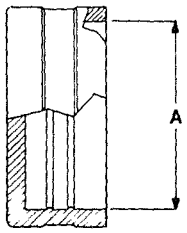
inches(mm)

| PART NUMBER | A | B | C | D | E |
|---|---|---|---|---|---|
| C2-2 | 2.45(62.23) | .24(6.10) | .48(12.19) | .72(18.29) | .97(24.64) |
| C3-3 | 3.50(88.9) | .25(6.35) | .50(12.7) | .75(19.05) | 1.00(25.4) |
| C4-175-2 | 4.50(114.3) | 1.75(44.45) | — | — | — |
| C5-4 | 5.563(141.30) | 2.25(57.15) | 1.24(31.50) | 1.00(25.4) | — |
| C9-275-3 | 9.38(238.2) | 2.75(69.9) | — | — | — |

TABLE D

## Flat caps

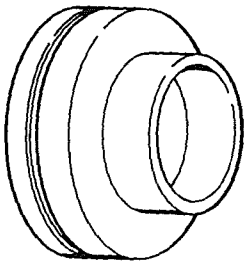


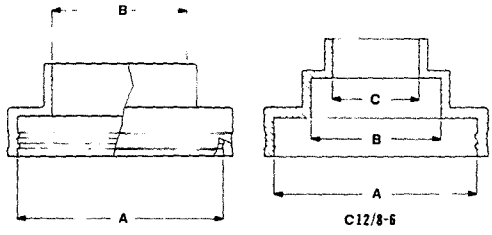



inches(mm)

| PART NUMBER | A |
|---|---|
| C2 | 2.45 (66.23) |
| C3 | 3.50(88.9) |
| C4 | 4.50(114.3) |
| C5 | 5.563(141.3) |
| C6 | 6.625(168.28) |
| C7 | 7.625(193.68) |
| C8 | 8.625(219.08) |
| C9 | 9.375(238.13) |
| C10 | 10.750(273.05) |
| C12 | 12.750(323.85) |

## Puddle caps



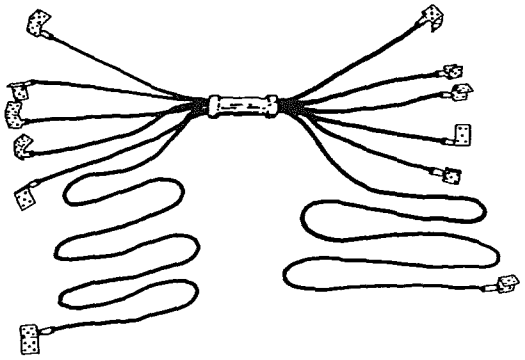



inches(mm)

| PART NUMBER | A | B | C |
|---|---|---|---|
| C7-5 | 7.625(193.68) | 5.00(127) | |
| 1 C8-7 | 8.625(219.08) | 7.00(177.8) | |
| C9-5 | 9.375(238.13) | 5.00(127) | |
| C9-7 | 9.375(238.13) | 7.00(177.8) | |
| C10-8 | 10.75(273.05) | 8.00(203.2) | |
| C12/8-6 | 12.75(323.85) | 7.88(200.15) | 5.92(150.37) |

BONDING HARNESS

2.05 The bonding harness (Figure 2) consists of a group of insulated wire leads all electrically connected. A bond clip is attached to the free end of each lead. A sufficient number of harnesses must be ordered to allow the shields of all cables entering the closure to be electrically bonded together. Each bonding harness consists of two 12 gauge insulated wire leads of sufficient length to reach across the splice and attach to the main cable, and ten 14 gauge leads (one for each terminating cable). The chart below (Figure 2) indicates both ordering numbers and the number of harnesses supplied. Harnesses are pre-cut to the correct size.



| PART NUMBER | SLEEVE DIA. | SET INCLUDES |
|---|---|---|
| BH2-6 | 2-6(50.8-152.4) | 1 harness |
| BH-7 | 7(177.8) | 2 harnesses |
| BH-8-9 | 8-9(203.2-228.6) | 3 harnesses |
| BH-10-12 | 10-12(254-304.8) | 4 harnesses |

Figure 2. Bonding Harness

2.06 The parts listed in Table F are not furnished and must be ordered separately as required. An explanation of the parts follows:

Bushings--Rubber bushings are used with special collared caps to reduce the inside diameter of cable openings. The chart shows part numbers as well as the inside and outside diameters.

Variable Bushings--A hollow, trimmable stepped bushing, to facilitate adapting special sized cables thru the use of flat end caps. After trimming each bushing to the cable diameter, the bushing is then cemented in an opening which has been cut in the flat caps.

Collared Plugs--These rubber, cup shaped collared plugs are used to plug unwanted openings on special end caps. They may be removed as additional cables are required. Five sizes are available.

Tapered Plugs--These plugs are used to close unwanted tip cable entrances on multiple and special caps. They are easily removed as necessary.

KB-S1--K&B Vault Closure Sealing Kit. Used for both new and existing vault closures, the KB-S1 Sealing Kit seals split sleeves and end caps. Once sealed with KB-S1 as per the instructions in the kit, split closures will withstand vault flooding and flash testing requirements.

## 3. ORDERING INFORMATION

3.01 Closures for central office vault splices can be ordered as a complete unit. Due to the large number of combinations of closures for building cable splices, the various components must be ordered separately.

To assist in ordering the correct piece parts use 3M/K&B Vault and Riser Brochure ED-CB 20C. They can be obtained from 3M Company or from one of their representatives.

3.02 A complete closure for central office vaults and entrance cable splices consists of the following items:

1 Sleeve

1 Single opening end cap

1 Multiple opening end cap

Sealing Clamps

1 Cable Lubricant

1 Instruction Sheet

3.03 The type of multiple opening end cap required is determined by terminating cables. Since these caps are different, the closure must be ordered by size and type of end cap required. Use Table A as a guide for ordering the complete closure.

3.04 As an example: If the main cable is 2.89 inches in diameter and eighteen 24 gauge 300 type connector stub cables are to be spliced, the correct closure to order is KB8-100-24. In this case the six unused cable entry ports may be plugged for future use by using PT-100 tapered plugs (Table F).

3.05 Closure components for building cable splices are ordered individually, depending on the number and size of cables proposed on the work order. Since cable diameters determine which components are required, refer to Table G for cable diameters.

3.06 As an example, the following closure components are required for a 900 pair, 26 gauge, BKTA building riser cables with four 100 pair gauge, BKMA floor distribution cables:

| QTY. | COMPONENT |
|---|---|
| 1 | 6-26 Sleeve or 6DS-26 Sleeve |
| 2 | C6-SP-4 End Caps |
| 2 | B275-200 Bushings (a) |
| 4 | B175-125 Bushings (b) |
| 2 | PT-267 Plugs (c) |
| 4 | B125-100 Bushings (b) |

(a) The B275-200 bushings are required to reduce the 2.75 inch inside diameter hole of each C6-SP-4 end cap to 2.00 inches to accommodate the 900 pair, 26 gauge cable which is 2.0 inches outside diameter.

(b) The B175-125 and B125-100 bushings are placed in the 1.25 to 1.75 inch outside diameter holes for each C6-SP-4 end cap to reduce these openings to 1.0 inch to accommodate the 100 pair, 24 gauge BKMA floor distribution cable which is 1.0 inch outside diameter.

NOTE 1: If a split end cap is required (main cap not cut) the KB-S1 Sealing Kit is also required.

NOTE 2: All caps and sleeves can be factory custom cut to fit the desired cable diameters upon request. Sleeve lengths available up to 12 foot in length.

NOTE 3: For vertical new construction installations, order the closure system as usual with the additional statement "With Vertical Fire Shield". With this designation, a vertical fire shield will be factory installed on the lower end cap.

## 4. CABLE SHEATH PREPARATION AND INSTALLATION OF CLOSURES FOR CENTRAL OFFICE VAULT SPLICE

4.01 The main cable entering central office vaults normally terminate with 300 type connector stubs.

4.02 All cables to be joined will normally be cable ends, and a solid sleeve will be used. However, in some instances due to bends in the main cable in close proximity to the splice location, a split sleeve may be required. SLEEVES CANNOT BE SPLIT IN THE FIELD.

4.03 Select the proper closure size from Table A. The size closure is determined by the size of the feeder cable and splicing method used. A complete unit should be ordered as outlined in Section 3.

4.04 When setting up cables for splicing, provide sufficient straight length in the main cable to allow placing an end cap and sleeve prior to starting the splicing operation.

4.05 After setting up the cable for splicing, locate the center of the splice, then place B paper tape markers on the main cables and terminating cables so that the distance between the markers is 3 inches shorter than the length of the sleeve to be installed. These 3 inches will be used by the internal nipples of the multiple opening end cap and bonding harness connection to the cables.

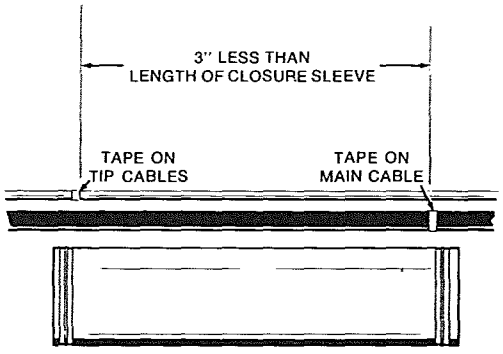
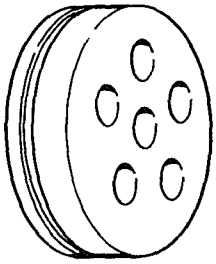
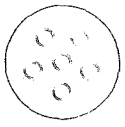


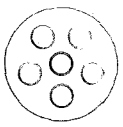

Figure 3.

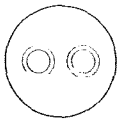
## TABLE E

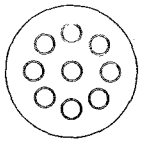
### Multiple end caps

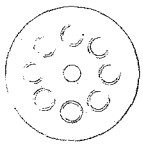


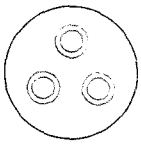

C5-100-6

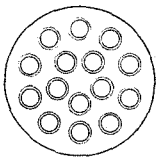

C5-130-6

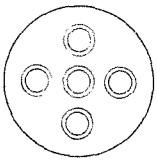

C5-175-2

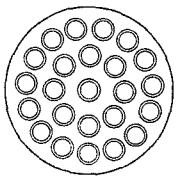

C6-100-9

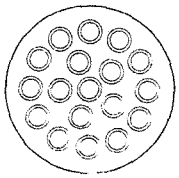

C6-130-9

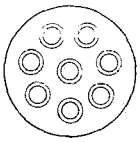

C6-175-3

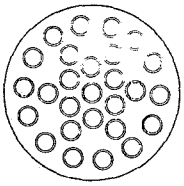

C7-100-15

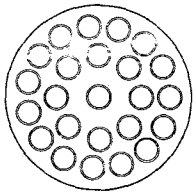

C7-175-5

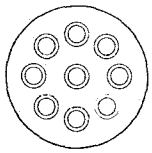

C8-100-24

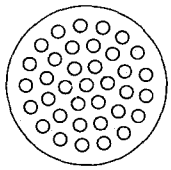

C8-130-18

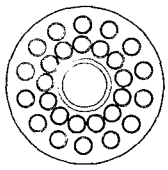

C8-175-8

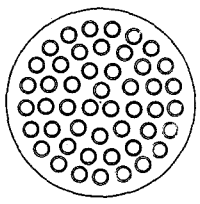

C9-100-27

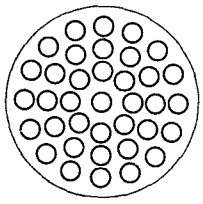

C9-130-24

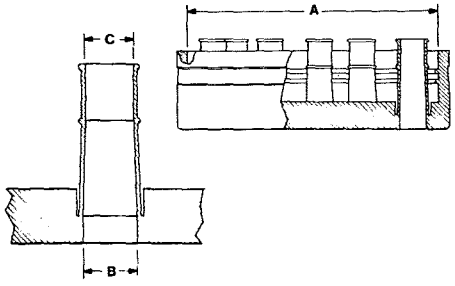

C9-175-9


C10-100-36


C10-100-27/300 ESS


C12-100-48


C12-130-37



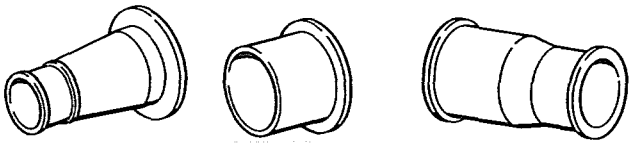

inches(mm)

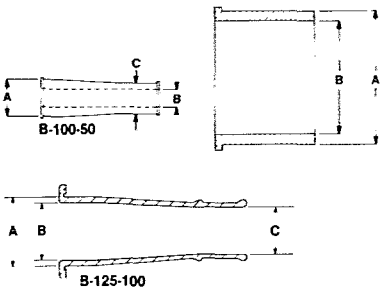
| PART NUMBER | A | B | C* |
|---|---|---|---|
| C5-100-6 | 5.563(141.30) | 1.06(25.4) | .85(22.85) |
| C5-130-6 | 5.563(141.30) | 1.30(33.02) | 1.08(30.48) |
| C5-175-2 | 5.563(141.30) | 1.75(44.45) | 1.25(31.75) |
| C6-100-9 | 6.625(168.28) | 1.06(25.4) | .85(22.85) |
| C6-130-9 | 6.625(168.28) | 1.30(33.02) | 1.08(30.48) |
| C6-175-3 | 6.625(168.28) | 1.75(44.45) | 1.24(31.50) |
| C7-100-15 | 7.625(193.68) | 1.06(25.4) | .85(22.85) |
| C7-175-5 | 7.625(193.68) | 1.75(44.45) | 1.24(31.50) |
| C8-100-24 | 8.625(219.08) | 1.06(25.4) | .85(22.85) |
| C8-130-18 | 8.625(219.08) | 1.30(33.02) | 1.08(24.60) |
| C8-175-8 | 8.625(219.08) | 1.76(44.70) | 1.24(31.50) |
| C9-100-27 | 9.375(238.13) | 1.06(25.4) | .85(22.85) |
| C9-130-24 | 9.375(238.13) | 1.30(33.02) | 1.08(30.48) |
| C9-175-9 | 9.375(238.13) | 1.75(44.45) | 1.25(31.75) |
| C10-100-36 | 10.750(273.05) | 1.06(25.4) | .85(22.85) |
| C10-100-27/300 ESS** | 10.750(273.05) | 1.06(25.4) | .85(22.85) |
| C12-100-48 | 12.750(323.85) | 1.06(25.4) | .85(22.85) |
| C12-130-37 | 12.750(323.85) | 1.30(33.02) | 1.20(27.94) |

*Note: This is a rubber dimension. Minimum cable diameter must provide for .05" stretch.
**ESS cap also features 3 inch (76.2mm) collar.

TABLE F

## Bushings

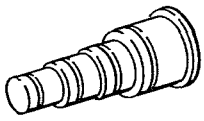




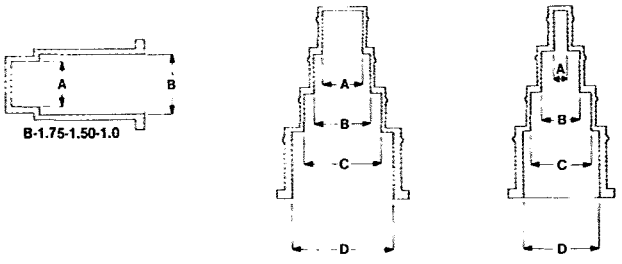

inches(mm)

| PART NUMBER | A | B | C |
|---|---|---|---|
| B-100-50 | 1.04(26.42) | .50(12.7) | .86(21.84) |
| B-100-70 | 1.04(26.42) | .70(17.8) | 1.06(26.92) |
| B-125-100 | 1.25(31.75) | 1.00(25.4) | .845(20.83) |
| B-175-125 | 1.75(44.45) | 1.25(31.75) | |
| B-175-150 | 1.75(44.45) | 1.50(38.10) | |
| B-225-175 | 2.25(57.15) | 1.75(44.45) | |
| B-275-200 | 2.75(69.85) | 2.00(50.80) | |
| B-275-225 | 2.75(69.85) | 2.25(57.15) | |
| B-275-250 | 2.75(69.85) | 2.50(63.50) | |
| B-300-275 | 3.00(76.20) | 2.75(69.85) | |
| B-360-300 | 3.60(91.44) | 3.00(76.20) | |
| B-360-330 | 3.60(91.44) | 3.30(83.82) | |
| B-390-360 | 3.90(99.06) | 3.60(91.44) | |

## Variable bushings



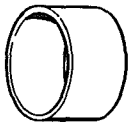
inches(mm)

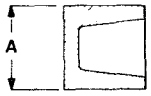



| PART NUMBER | ACCOMMODATED CABLE SIZES |
|---|---|
| B-1.0-2.5 | .49(6.3) |
| | .69(14) |
| | .79(21.3) |
| | 1.0(25.4) |
| B-1.75-1.50-1.0 | 1.12(25.4) |
| | 1.50(38.1) |
| | 1.75(44.4) |
| B-2.5-1.0 | 1.0(25.4) |
| | 1.4(35.6) |
| | 1.9(48.2) |
| | 2.5(63.3) |

TABLE F (Cont.)

## Collared plugs

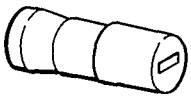


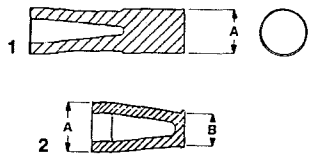



inches(mm)

| PART NUMBER | A |
|---|---|
| PC-155 | 1.55(39) |
| PC-175 | 1.75(44) |
| PC-225 | 2.25(57) |
| PC-275 | 2.75(70) |
| PC-298 | 2.98(76) |

## Tapered plugs

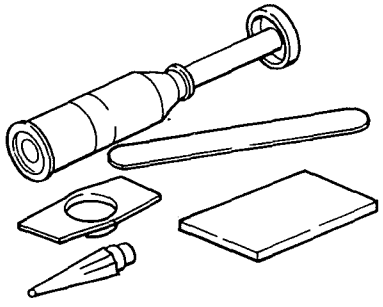





inches(mm)

| PART NUMBER | A | B | ILLUS. |
|---|---|---|---|
| PT-100 | 1.0(26) | — | 1 |
| PT-120 | 1.2(30.5) | — | 1 |
| PT-125 | 1.25(32) | .82(20.8) | 2 |
| PT-130 | 1.3(33) | — | 1 |
| PT-175 | 1.83(46.5) | 1.60(40.5) | 2 |
| PT-225 | 2.36(59.9) | 1.88(47.5) | 2 |
| PT-267 | 2.71(68.8) | 2.16(54.9) | 2 |

## KB-S1, K&B Vault closures sealing kit



## Cable lubricant

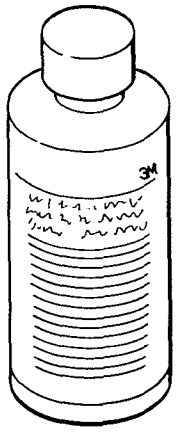
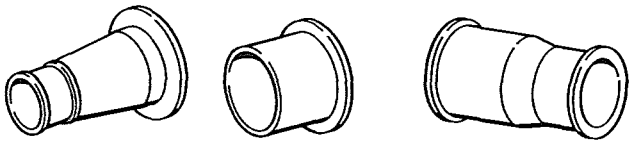
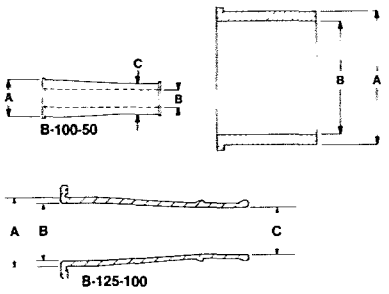


TABLE F

## Bushings

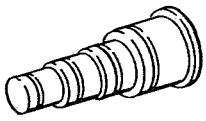




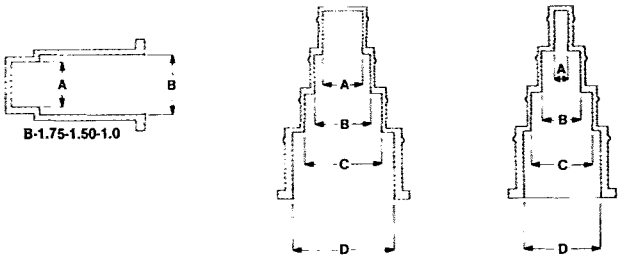

inches(mm)

| PART NUMBER | A | B | C |
|---|---|---|---|
| B-100-50 | 1.04(26.42) | .50(12.7) | .88(21.84) |
| B-100-70 | 1.04(26.42) | .70(17.8) | 1.06(26.92) |
| B-125-100 | 1.25(31.75) | 1.00(25.4) | .845(20.83) |
| B-175-125 | 1.75(44.45) | 1.25(31.75) | |
| B-175-150 | 1.75(44.45) | 1.50(38.10) | |
| B-225-175 | 2.25(57.15) | 1.75(44.45) | |
| B-275-200 | 2.75(69.85) | 2.00(50.80) | |
| B-275-225 | 2.75(69.85) | 2.25(57.15) | |
| B-275-250 | 2.75(69.85) | 2.50(63.50) | |
| B-300-275 | 3.00(76.20) | 2.75(69.85) | |
| B-360-300 | 3.60(91.44) | 3.00(76.20) | |
| B-360-330 | 3.60(91.44) | 3.30(83.82) | |
| B-390-360 | 3.90(99.06) | 3.60(91.44) | |

## Variable bushings



inches(mm)




| PART NUMBER | ACCOMMODATED CABLE SIZES |
|---|---|
| B-1.0-2.5 | .49(6.3) |
| | .69(14) |
| | .79(21.3) |
| | 1.0(25.4) |
| B-1.75-1.50-1.0 | 1.12(25.4) |
| | 1.50(38.1) |
| | 1.75(44.4) |
| B-2.5-1.0 | 1.0(25.4) |
| | 1.4(35.6) |
| | 1.9(48.2) |
| | 2.5(63.3) |

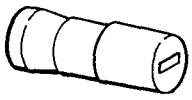
TABLE F (Cont.)

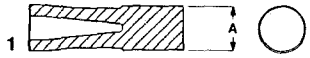
## Collared plugs

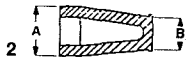

inches(mm)

| PART NUMBER | A |
|---|---|
| PC-155 | 1.55(39) |
| PC-175 | 1.75(44) |
| PC-225 | 2.25(57) |
| PC-275 | 2.75(70) |
| PC-298 | 2.98(76) |

## Tapered plugs



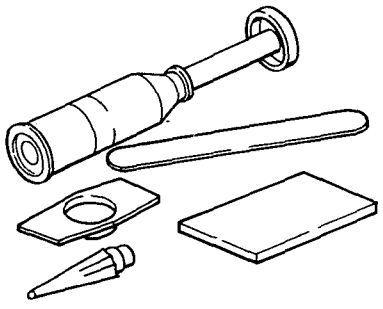


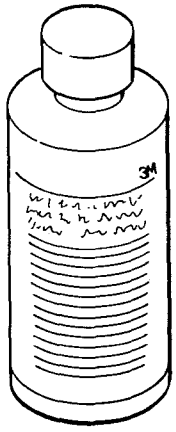

inches(mm)

| PART NUMBER | A | B | ILLUS. |
|---|---|---|---|
| PT-100 | 1.0(26) | — | 1 |
| PT-120 | 1.2(30.5) | — | 1 |
| PT-125 | 1.25(32) | .82(20.8) | 2 |
| PT-130 | 1.3(33) | — | 1 |
| PT-175 | 1.83(46.5) | 1.60(40.5) | 2 |
| PT-225 | 2.36(59.9) | 1.88(47.5) | 2 |
| PT-267 | 2.71(68.8) | 2.16(54.9) | 2 |

## KB-S1, K&B Vault closures sealing kit



## Cable lubricant



# TABLE G
# CABLE DIAMETERS

## ALPETH

| SIZE (PRS) | BKTA 26 | BKMA 24 | BHAA 22 | BHBA 19 |
|---|---|---|---|---|
| 50 | 0.6 | 0.7 | 0.8 | 1.1 |
| 100 | 0.8 | 0.9 | 1.1 | 1.5 |
| 200 | 1.0 | 1.2 | 1.5 | 2.0 |
| 300 | 1.2 | 1.4 | 1.8 | 2.5 |
| 400 | 1.3 | 1.6 | 2.0 | |
| 600 | 1.5 | 1.9 | 2.4 | |
| 900 | 1.9 | 2.3 | | |

## STALPETH

| SIZE (PRS) | ADTC 26 | ADMC 24 | ADAC 22 | ADBC 19 |
|---|---|---|---|---|
| 300 | 1.16 | 1.37 | 1.68 | 2.35 |
| 400 | 1.3 | 1.55 | 1.95 | 2.67 |
| 450 | | | | 2.82 |
| 600 | 1.54 | 1.88 | 2.32 | |
| 900 | 1.87 | 2.24 | 2.78 | |
| 1200 | 2.12 | 2.55 | 3.17 | |
| 1500 | 2.33 | 2.82 | | |
| 1800 | 2.53 | 3.05 | | |
| 2100 | 2.71 | 3.39 | | |
| 2400 | 2.88 | | | |
| 2700 | 3.04 | | | |
| 3000 | 3.17 | | | |
| 3600 | 3.39 | | | |

## DUCT PIC

| SIZE (PRS) | DCTZ 26 |
|---|---|
| 1200 | 1.95 |
| 1800 | 2.33 |
| 2400 | 2.65 |
| 3000 | 2.88 |
| 3600 | 3.08 |
| 4200 | 3.35 |

## STALVYN

| SIZE (PRS) | ADTN 26 | ADMN 24 |
|---|---|---|
| 600 | 1.5 | 1.8 |
| 900 | 1.8 | 2.2 |
| 1200 | 2.1 | 2.5 |
| 1500 | 2.3 | 2.8 |
| 1800 | 2.5 | 3.0 |
| 2100 | 2.7 | |
| 2400 | 2.8 | |
| 2700 | 3.0 | |

## ALVYN

| SIZE (PRS) | ABMM 24 | ABAM 22 |
|---|---|---|
| 51 | | 0.9 |
| 76 | | 1.1 |
| 101 | 1.00 | 1.2 |
| 152 | 1.2 | 1.5 |
| 202 | 1.3 | 1.7 |
| 303 | 1.6 | 2.0 |
| 404 | 1.8 | 2.3 |
| 606 | 2.2 | 2.8 |
| 909 | 2.7 | |
| 1200 | 2.9 | |

## ALVYN (HIGH DENSITY)

| SIZE (PRS) | ARTM 26 | ARMM 24 | ARAM 22 |
|---|---|---|---|
| 100 | | .89 | |
| 150 | | 1.06 | 1.27 |
| 200 | | 1.19 | 1.43 |
| 300 | 1.17 | 1.41 | 1.70 |
| 400 | 1.33 | 1.59 | 1.93 |
| 600 | 1.58 | 1.90 | 2.32 |
| 900 | 1.88 | 2.28 | 2.79 |
| 1200 | 2.14 | 2.60 | |
| 1800 | 2.57 | 3.14 | |
| 2400 | 2.93 | | |
| 2700 | 3.09 | | |
| 3000 | 3.25 | | |
| 3600 | 3.53 | | |

SHEATH PREPARATION--MAIN CABLES

4.06 Using the procedures outlined in Section 632-315-200, remove the polyethylene jacket between the paper tape markers and the end of the cable.

4.07 Remove the corrugated steel terneplate between the paper tape marker and the end of the cable.

4.08 Cut the aluminum shield (Figure 4) 3/4 inch from the paper tape marker and remove from the cable. Remove the paper tape marker.

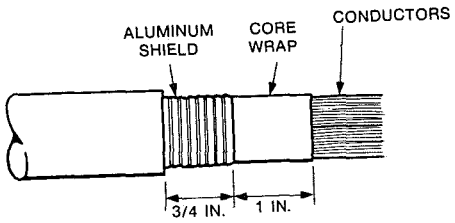



Figure 4. Cable Sheath Preparation

SHEATH PREPARATION--STUB CABLES FOR TERMINATING CABLES

4.09 Remove the PVC jacket between the paper tape markers and the end of the cable before pulling the cable into the multiple end caps.

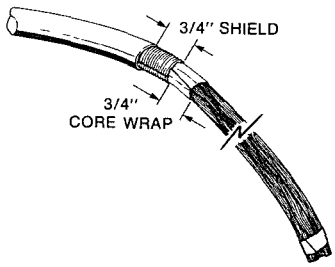



Figure 5. Remove Sheath and Shield

4.10 Cut the aluminum shield (Figure 4) 3/4 inch from the paper tape marker and remove from the cable. Remove the paper tape marker. Place a wrap of 3/4 inch vinyl tape around the aluminum shield to prevent damage to the nipple of the multiple cap when pulling tip cables into the cap.

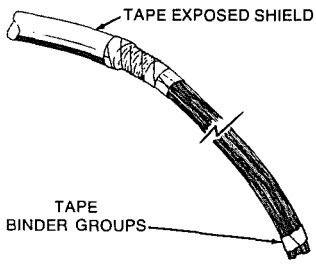



Figure 6.

INSTALLATION

4.11 Install a sealing clamp on the single opening end cap.

4.12 Position the single opening end cap and sleeve on the main cable and slide back along the cable sheath approximately the length of the sleeve as shown in Figure 7. Position tip cables into the cap so the PVC jacket extends approximately one half inch past the inside edge of the nipple. Use the K&B Cable Lubricant provided with the closure to ease the cable installation.

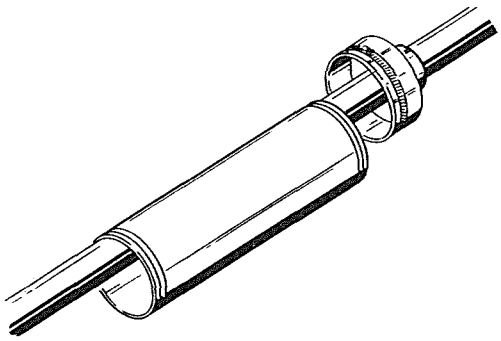


Figure 7. Single Opening End Cap & Sleeve Placed on Main Cable

4.13 Prior to installing the multiple end cap, determine the number of openings, if any, to be left vacant, then insert the tapered plugs as shown in Figure 8 in the unused openings. These openings should be located in the front of the splice. Be sure that the plug is inserted with the shoulder of the plug extended beyond the narrow end of the nipple inside the cap.

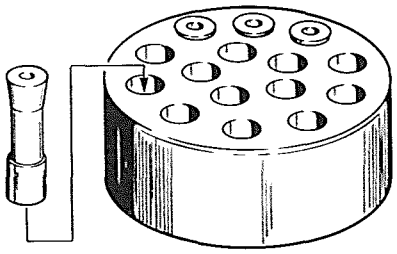


Figure 8. Tapered Plug Inserted in Unused Opening

4.14 Starting at the back of the end cap, insert the tip cable into an individual opening of the multiple end cap shown in Figure 9.

NOTE: UNDER NO CIRCUMSTANCES SHOULD THE NIPPLE BE CUT OR SLIT. The tight fit of the nipple is required for moisture protection. If difficulty is encountered in pulling the tip cables into the cap using cable lubricant, recheck cap size and cable diameter to insure the proper cap has been ordered.

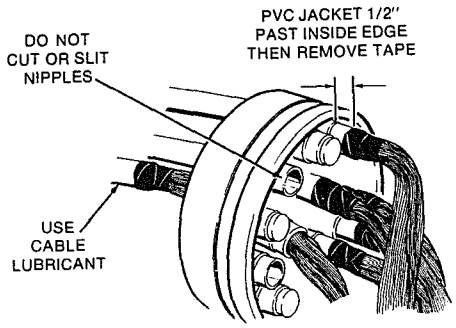



Figure 9.

4.15 Remove the core wrapper from the main cable to within 1 inch of the aluminum as shown in Figure 4. Tape the ends of the main cables to hold the binder units intact.

4.16 Install and crimp one 6 inch lead of the bonding harness to the aluminum shield of the main cable as shown in Figure 10.

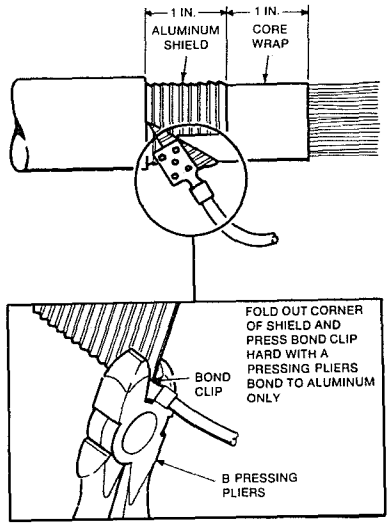



Figure 10. Installing Bond Clip to Cable Shield

4.17 Wrap the butt of the main cable with two layers of vinyl tape to reinforce the bond clip connection as shown in Figure 11.

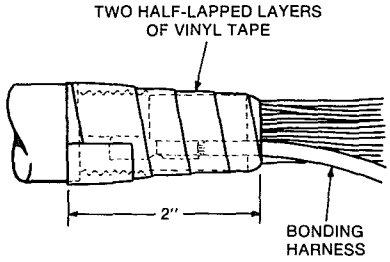



Figure 11. Butt of Cable Wrapped with Vinyl Tape

4.18 Repeat 4.14 through 4.17 for each main cable used.

4.19 Remove the core wrapper from the tip cables to within 1 inch of the aluminum shield as shown in Figure 4, then cut and fold back the aluminum shield on each side of the overlay.

4.20 Connect the long leads, of the first bonding harnesses installed, to the aluminum shield of the tip cables. This provides sheath continuity between the shields of the main cable and the tip cables during the splicing operation.

4.21 Splice the bonded cables.

4.22 As the splicing operation progresses, repeat 4.20 and 4.21 for the remaining bonding harnesses and main cable.

4.23 After all the long leads of the bonding harnesses have been crimped to the shield of the tip cables (Figure 12), wrap the butt of the tip cables with two layers of vinyl tape to reinforce the bond clip connections.

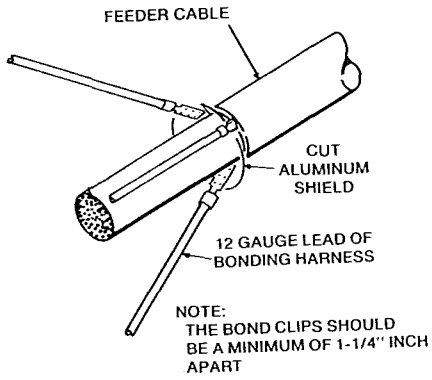



Figure 12. Feeder Cable with 12-Gauge Leads of Bonding Harness Attached

4.24 After all wire joining has been completed, protect the splice by wrapping a half lapped layer of B Splice Wrap AT-8907 as shown in Figure 13.

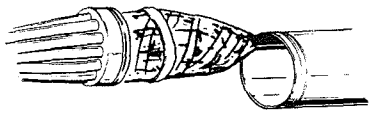


Figure 13. Splice Wrapped with "B" Splice Wrap AT-8907

NOTE: Do not leave an unwrapped splice unattended. If necessary to leave an unwrapped splice it should be protected as outlined in Section 632-490-200.

ENCLOSING THE SPLICE

4.25 Slip the sleeve over the splice into the multiple end cap. If the sleeve will not slide over the splice, do not beat the splice with a dresser. Re-form the splice. (For installing split sleeve see 4.29.)

4.26 Secure the multiple end cap to the sleeve with a sealing clamp.

4.27 Slide the single opening end cap over the opposite end of the sleeve and secure it to the sleeve with a sealing clamp. The assembled splice closure is shown in Figure 14.

NOTE: The diameter of the hole in the single opening end cap must be a maximum of equal to and a minimum of .25 inches less than the main cable diameter. To check these figures, measure the cable diameter, then compare it with the cap opening diameter printed on the face of the cap. EXAMPLE--C8-300-1C, printed on the cap, indicates that this 8 inch cap has an opening of 3.00 inches. Therefore, the diameter of the main cable must be at least 2.75 inches. If not, bushings are required to build up the cable diameter so it is equal to or within .25 inch less than the diameter of the opening on the cap.

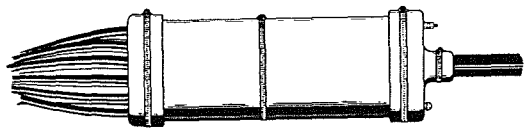


Figure 14. Enclosed Splice

4.28 Install and secure a sealing clamp on the collar of the single opening end cap.

SINGLE SPLIT SLEEVE INSTALLATION AND SEALING

4.29 Grasp one end of the sleeve with a hand on each side of the split. Force the split open and place on the main cable. Move the hands along the split and work the sleeve onto the cable and over the splice. See Sections B and C, Split Sleeve Preparations and Assembly, Paragraphs 7.03 through 7.11.

4.30 When the sleeve has been placed over the splice, apply KB-S1 adhesive (see Section 7) to the groove portion of the sleeve and engage the tongue and groove. Place additional sealing clamps, furnished with the closure, over the sleeve and tighten securely. The clamps should be evenly spaced.

4.31 Repeat 4.25 through 4.28 for sealing the end caps. Once end caps are installed on the sleeve they should not be disturbed for four hours.

SUPPORTING CLOSURE

4.32 To support the closure, use RC-100 rack clips as follows:

(a) The 3M/K&B Rack Clips RC-100 (Figure 15) consist of two brackets and two clips. The brackets are holding devices for positioning a standard manhole rack horizontally on vertical standard manhole racks or Unistrut type racks, the clips are holding devices for positioning the standard manhole hooks on a horizontal manhole rack.

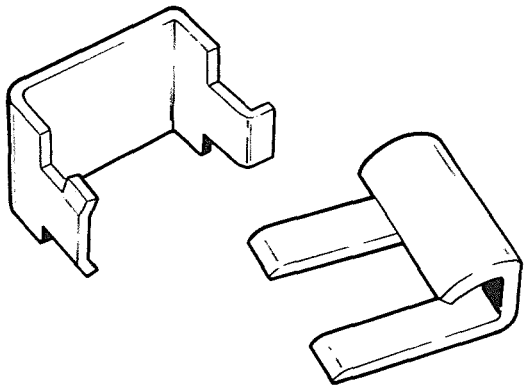


Figure 15. K&B Rack Clips RC-100

(b) Install the rack clips on vertical standard manhole racks as follows:

(1) Determine height of required splice support. Insert top tab of bracket into T slot of vertical manhole rack, then insert the bottom tab. Push down on bracket to lock into rack (Figure 16). Insert second bracket into adjacent T slot of vertical manhole rack at the same height as the first bracket.

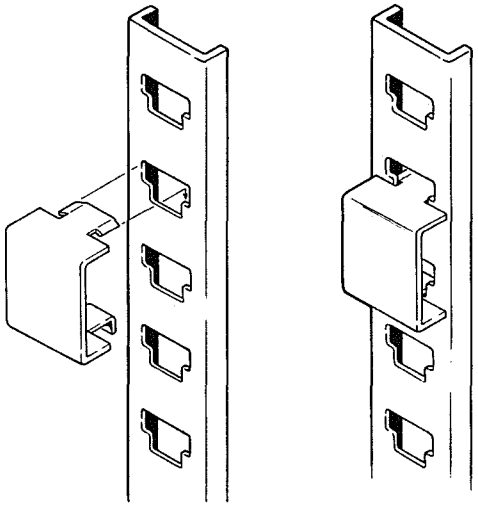


Figure 16. Bracket Installation

(2) Insert a standard manhole rack through the brackets as shown in Figure 17.

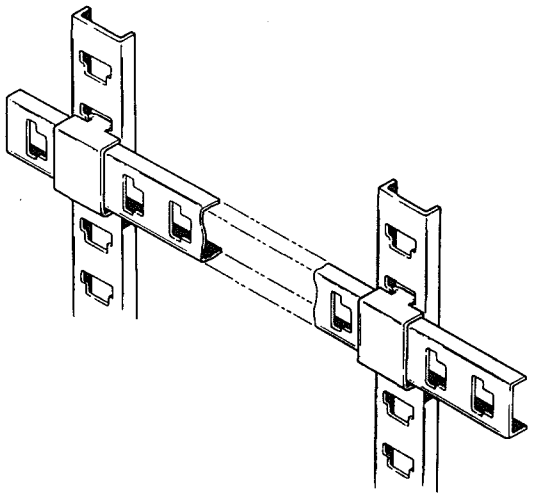


Figure 17. Installed Manhole Rack

(3) Insert clips over manhole hooks as shown in Figure 18, then determine horizontal position of required support. Hook clip over upper flange of horizontal rack and rotate into position as shown in Figure 19.

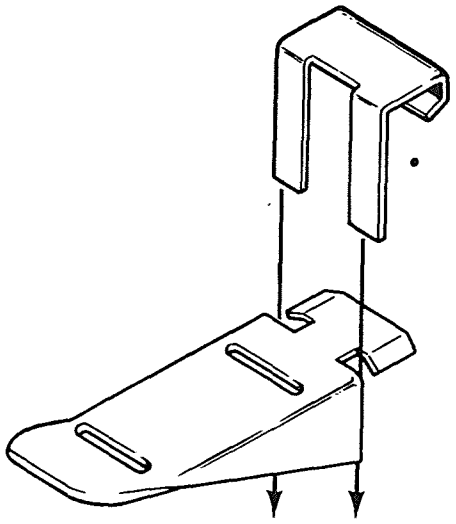


Figure 18. Placing Clip on Manhole Rack

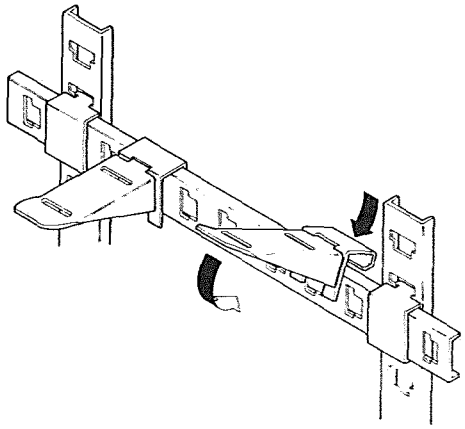


Figure 19. Placing Hook on Rack

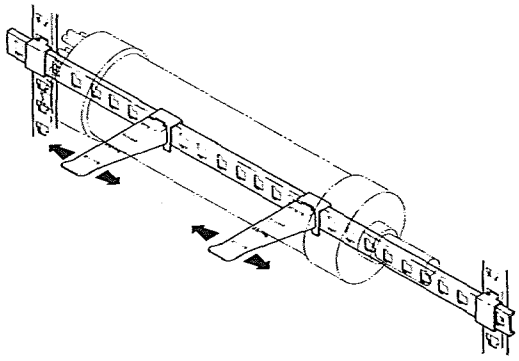


Figure 20. Supporting Closure

(4) Position closure on hook as shown in Figure 20.

(c) Install rack clip on Unistrut type racks as follows:

(1) Determine height of required splice support, diagonally insert top tab of bracket into slot. Rotate bracket and drop lower tap into slot. Push down on bracket to lock into rack. (Figure 21) Repeat for opposite Unistrut rack.

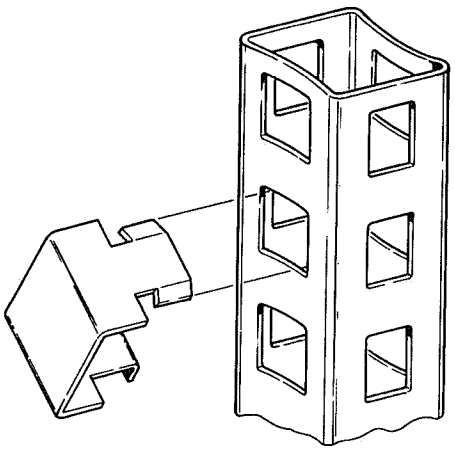


Figure 21. Unistrut Type Racks and RC-100 Rack Clips

(2) Complete installation per steps 2-4, part (b).

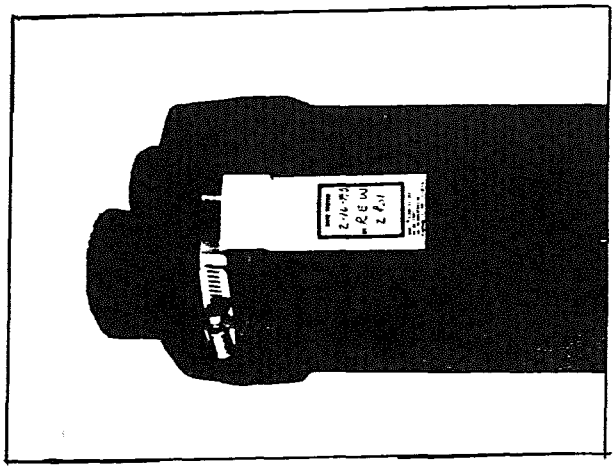
FLASH TESTING

4.33 Flash test each closure with a back pressure of 2 to 8 psi as indicated on a pressure gauge.

4.34 Apply a solution of B pressure testing concentrate to the closure and entrance and tip cables. Check the closure for leaks indicated by bubbles. The use of ultrasonic leak detecting equipment is preferable when available since it is difficult to apply concentrate between the stub cables.

If leaks are detected, retighten the clamps. Do not use a soap solution or detergent since these materials will damage polyethylene. Remove pressure after flash testing. If a leak is detected at the main cable opening or where the cap fits over the sleeve, retighten clamps to stop these leaks. If a leak occurs along the seam of the split closure, apply additional KB-S1 adhesive at the point of the leak and allow to dry for four hours. Flash test at 2 to 8 psi. Relieve pressure after flashing to prevent damage to the tip cables.

4.35 If no leaks are detected, place a 5050 Seal (label Part #17003) on both ends of the sleeve extending onto the end cap. The seal must be dated and initialed. (Figure 21A)



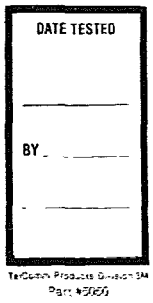
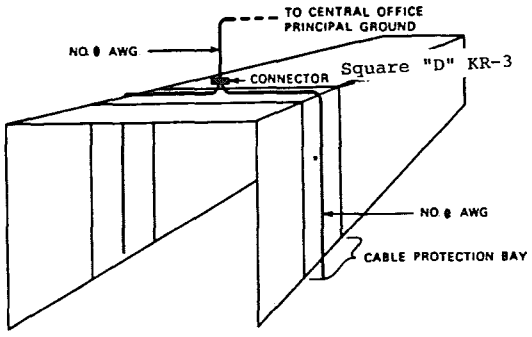


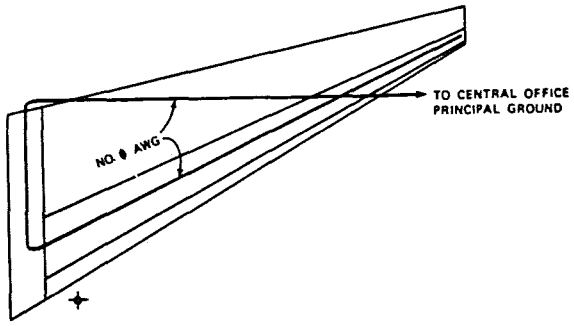

Figure 21A.

GROUNDING

4.36 The metallic shield of all entrance cables must be bonded with a No. 6 copper conductor or bonding ribbon to the No. 1/0 copper conductor which is connected to the central office principal ground point. Use square "D" KR-3 bronze parallel connector or equivalent. (Figure 21B)



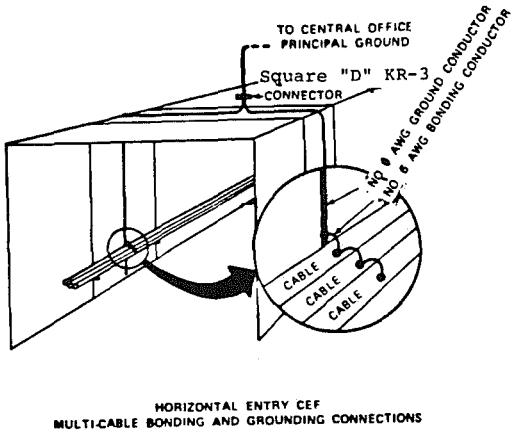

HORIZONTAL ENTRY CEF GROUNDING SYSTEM



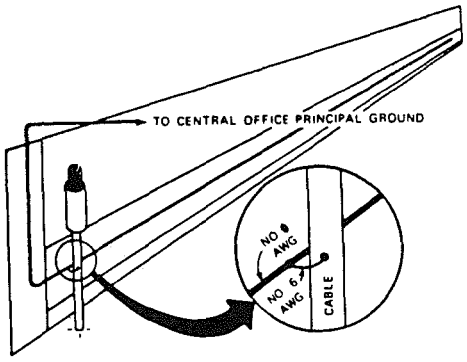

VERTICAL ENTRY CEF GROUNDING SYSTEM

Figure 21B

4.37 When more than one cable occupies the same horizontal racking level, each cable on that level will be connected in series with a No. 6 copper conductor or equivalent bonding ribbon, which in turn is then joined to the No. 1/0 ground conductor. For vertical entry, each cable is connected to the No. 1/0 ground conductor. Figure 21C.




HORIZONTAL ENTRY CEF
MULTI-CABLE BONDING AND GROUNDING CONNECTIONS




VERTICAL ENTRY CEF
CABLE BONDING AND GROUNDING CONNECTIONS

Figure 21C

NOTE: For additional bonding and grounding methods refer to 631-400-102.

## 5. CABLE SHEATH PREPARATION AND INSTALLATION OF CLOSURES FOR SUBSCRIBER BUILDING CABLE SPLICES

5.01 Prior to cable sheath preparation it will be necessary to select the proper size closure and components for the particular installation (Sections 2 and 3). At locations where future cable additions may be required, select an end cap with more cable openings than required for initial installation.

MAIN CABLE

5.02 When measuring for the splice opening in the main cable, the distance should be 3 inches shorter than the sleeve length. Splice openings in cables utilizing nipple type openings in the end cap shall be 1 inch shorter than the splice opening for the main cable. This additional inch is necessary for bonding the cable shield since the nipples protrude 1-1/2 inches inside the end cap. Measure and mark the sheath opening.

5.03 If the main cable is cut, place the cable through the main cable opening of the end cap. Slide the end cap far enough onto the cable to permit placing the sleeve where it will not interfere with the splicing operation. Place the sleeve on the main cable.

5.04 If the main cable is not cut, two split end caps and a split sleeve must be used. These caps can be ordered split or they can be split with a sharp knife. Do not split the tapered nipples of the end cap. (The tapered seal keeps the closure waterproof.) The sleeve must be ordered as a split sleeve; it cannot be split in the field. See Section 7--Sealing K&B Split Sleeve Closures and Split End Caps.

5.05 Place the split end caps on the main cable and seal as follows. Seal split sleeve using KB-S1 adhesive per paragraph 4.30. The KB-S1 adhesive is required to reseal a split end cap and takes about four hours to cure.

(a) Apply a bead of adhesive to both surfaces of the split in the cap.

(b) Place the end cap over the cable and onto the sleeve and match the two surfaces. Place 2 sealing clamps over the collar of the cable opening and the collar that fits over the sleeve. (See Figure 34 for placing clamps.) Tighten these clamps until the surfaces press firmly together. Allow four hours to cure.

5.06 If the main cable is unexposed, remove the cable sheath as outlined in 4.06 through 4.08. If the main cable is exposed and the splice is more than 50 feet from the entrance, the cable must be grounded as outlined in Section 6. Prepare the cable sheath as follows:

(a) Install a bond clamp as outlined in Section 081-852-118.

BRANCH CABLES

5.07 Remove the sheath from the branch cables as outlined in 4.09 and 4.10.

5.08 Place bushings or adapters, if required, in the openings of the end cap.

5.09 Insert the branch cables into the tapered openings of the adapters and install the bonding harness as outlined in 4.14 through 4.17.

5.10 If the feeder cable is unexposed, run the 12 gauge leads of the wiring harness across the splice opening and connect to the sheath of the feeder cable as outlined in 4.19 and 4.20. If the feeder cable is exposed, connect the 12 gauge leads of the wiring harness to the sheath of the feeder cable as follows:

(a) Remove the bond clips from each 12 gauge lead and strip approximately 1 inch of insulation from each lead.

(b) Secure the leads and bonding ribbon to the stud of bond clamp as shown in Figure 22.

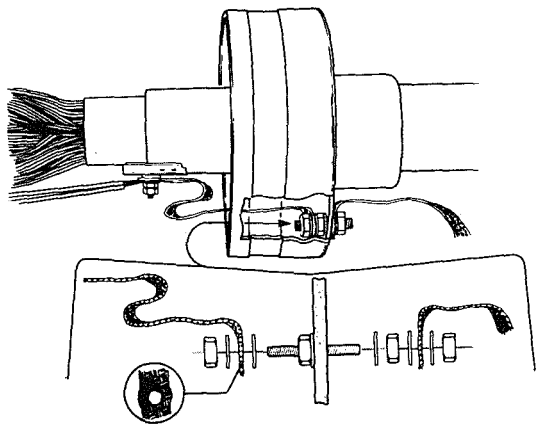


Figure 22. Installed Bonding Ribbon

5.11 Splice the bonded cables.

ENCLOSING SPLICE

5.12 Position one end cap so that the internal nipples are approximately 1 inch from the end of the cable sheath, and secure by placing a sealing clamp around the collar of the main cable opening.

5.13 If the sleeve was placed prior to making the splice, slide it over the splice and insert the end into the end cap. If the sleeve will not slide over the splice, re-form the splice. Do not beat the splice with a dresser.

5.14 A split sleeve can be placed directly over the splice or over the main cable and slid over the splice.

5.15 Apply KB-S1 to the grooved edge of the split sleeve (Figure 25). Using the additional sealing clamps furnished with split sleeve, close the seam and slide the sleeve into the end cap.

5.16 Slide the other end cap over the end of the sleeve. Place sealing clamps on both ends to secure the ends to the sleeve and also effect a seal.

5.17 Place sealing clamps on the collars of both end caps and tighten securely.

5.18 Unused openings in the end caps shall be plugged using the plugs which are available (Table C).

## 6. SUBSCRIBER BUILDING -- BONDING AND GROUNDING EXPOSED AND UNEXPOSED CABLES

EXPOSED CABLE

6.01 All exposed cable entering a subscriber building must be grounded as close to the entrance as possible, but not more than 50 feet from the the entrance. Where cable enters the building in conduit that is buried in a concrete floor, the point at which the cable emerges from the conduit is considered its entrance point.

6.02 All splices in entrance cables containing fewer than 400 pairs and located on the central office side of the protector must be enclosed in a metallic splice case.

6.03 When non-metallic splice cases are used on cables containing more than 400 pairs, the cable sheath on the central office side of the splice must be bonded to the protector ground terminal or the protector grounding electrode, whichever is closer. This must be done even where the protector is installed within 50 feet of the building entrance.

6.04 When waterproof cable is used for building entrances, the following requirements must apply.

- The cable shield must be bonded to the building ground within 50 feet of the entrance.
- Waterproof cable should not extend more than 50 feet into a building. (Section 631-400-102)
- A transition must be made to air core cable.

UNEXPOSED CABLE

6.05 When the cable sheath of unexposed cable is electrically continuous, the cable is considered adequately grounded if the cable is bonded to ground in a grounded metallic terminal housing. Sheath continuity must be maintained at all times in order for the cable to be adequately grounded.

## 7. SEALING K&B SPLIT SLEEVE CLOSURES AND SPLIT END CAPS

7.01 This Section describes the procedure for sealing K&B Split Sleeve Closures and Split End Caps with the #KB-S1 K&B Vault Closure Sealing Kit.

A. KIT COMPONENTS

7.02 The following materials are included in the #KB-S1 Vault Closure Sealing Kit. (Figure 23)

1 Ounce Adhesive Cartridge in Guard Bag

SCOTCHBRITE Pad

Nozzle

Finger Grip

Wooden Spatula

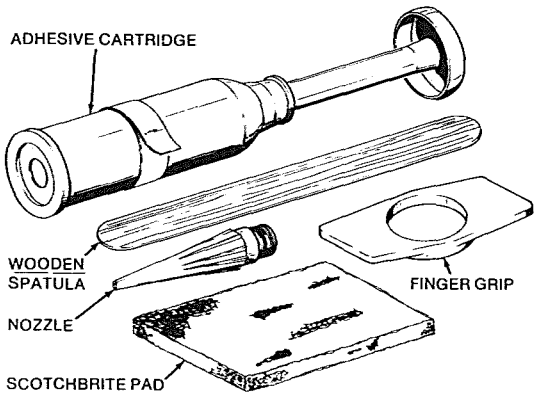



Figure 23. KB-S1 Vault Closure Sealing Kit

B. SPLIT SLEEVE PREPARATIONS

7.03 Sleeve halves must have a clean, dry surface for sealing. Scuff tongue and groove with the SCOTCHBRITE pad until the surface gloss is removed. Force pad onto tongue shoulders and into groove. (Figure 24)

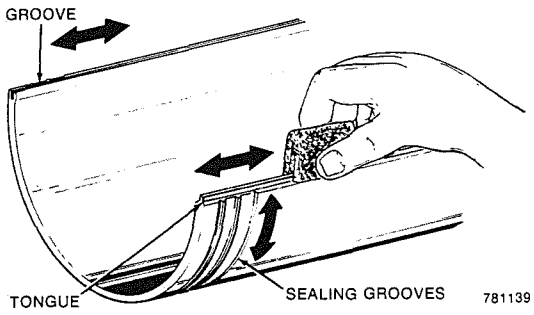



Figure 24. Scuff Tongue, Groove, and Sealing Grooves

7.04 Scuff end cap sealing grooves with the SCOTCHBRITE pad to remove all burrs and surface roughness. (Figure 24)

7.05 Clean scuffed areas with a brush, clean cloth, or compressed air to provide a clean dry surface for adhesive sealing.

7.06 Prepare cables and slide end caps onto cables per standard procedure.

7.07 Do not allow adhesive to contact conductors. When working with adhesive, wrap splice with B-splice wrap.

C. SPLIT SLEEVE ASSEMBLY

7.08 Mix adhesive per instructions on guard bag.

7.09 Apply one continuous bead of adhesive onto each groove. (Figure 25)

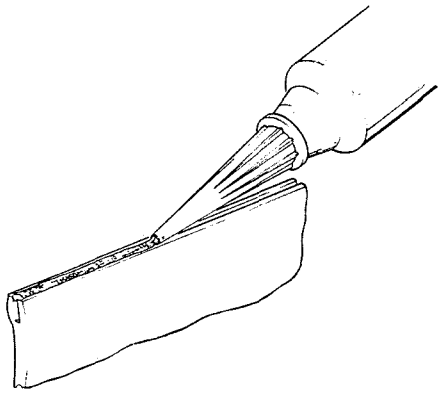


Figure 25. Apply Adhesive

7.10 Place sleeve halves around cables or splice and engage tongue and groove together. All end cap sealing grooves must align across sleeve halves. (Figure 26)

NOTE: If possible, assemble sleeve over feeder cable rather than splice.

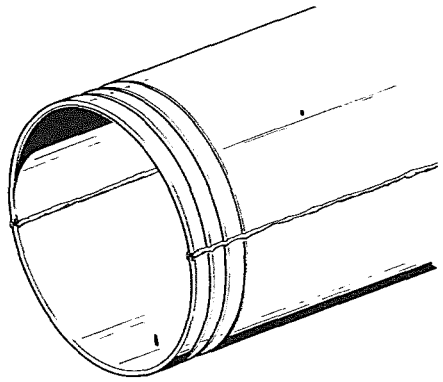


Figure 26. Align Sealing Grooves

NOTE: Do not remove adhesive displaced by tongue and groove since it helps form the seal between the sleeve halves.

7.11 Fasten a hose clamp around center of sleeve. (Figure 27)

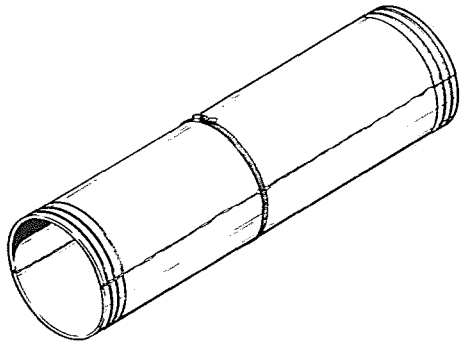


Figure 27. Fasten Center Hose Clamp

D. CLOSURE ASSEMBLY

7.12 Split sleeve closures should be assembled immediately after applying adhesive. When the closure assembly is delayed, (4 hours maximum) two additional hose clamps not supplied with the kit are required.

PROCEDURE A: Closure Assembly Immediately After Split Sleeve Assembly

7.13 Apply adhesive to the end cap sealing groove area at each sleeve seam (4 places) and smooth with spatula to remove voids.

7.14 Seat end caps into sealing grooves of sleeves. End caps must be firmly butted against sleeve.

7.15 Fasten a hose clamp around each end cap in the recess provided. (Figure 28)

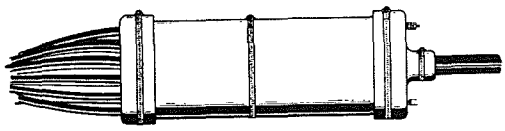


Figure 28. Completed Closure Assembly

PROCEDURE B: Closure Assembly with 4 Hours of Split Sleeve Assembly

7.16 Fasten an additional hose clamp 76 mm (3 inches) from each sleeve end. Since these hose clamps will not be moved, they must not interfere with the end caps. (Figure 29)

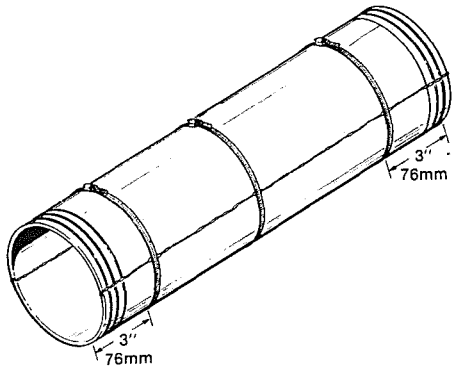



Figure 29. Fasten Two Additional Hose Clamps

7.17 Apply additional adhesive to the end cap sealing groove area at each sleeve split (4 places). Smooth adhesive with spatula across sleeve seam in each sealing groove. Bonded sleeve may be positioned over feeder cable to facilitate work operations. Exposed adhesive must not come in contact with other surfaces.

7.18 Seat end caps in sealing groove of sleeve within 4 hours of split sleeve sealing. End caps must be firmly butted against sleeve.

7.19 Fasten a hose clamp around each end cap in the recess provided for it. (Figure 30)

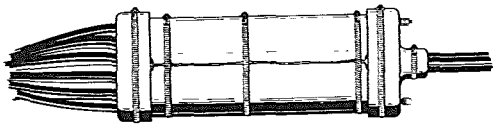


Figure 30. Completed Closure Assembly

E. FLASH TESTING

7.20 The closure can be flash tested after the adhesive has cured for 4 hours.

NOTE: The adhesive cure time depends on the cable vault temperature. Vault temperatures cooler than 22° C. (72°F.) will increase the adhesive cure time and the time before flash testing.

7.21 Flash test the closure with BACK PRESSURE of 2 to 8 psi as indicated on the pressure gauge.

F. ADHESIVE REPAIR

7.22 If a leak is detected, remove excess adhesive (in area of detected leak) and scuff sleeve exterior with SCOTCHBRITE pad until surface gloss is removed.

7.23 Mix adhesive per instructions on guard bag.

7.24 Apply adhesive to the leak area, smoothing adhesive with spatula to remove air voids and to insure even coverage.

7.25 Flash test closure after 4 hours (see note on adhesive cure time in Section E Flash Testing).

G. CLOSURE DISASSEMBLY

END CAP REMOVAL AND REASSEMBLY

7.26 Remove end cap hose clamps and lift edge of end cap at each adhesive buildup to release cap. Pry off end caps with fingers. Slide sleeve past splice.

7.27 If adhesive has cured for 24 hours, no additional adhesive is required for resealing.

7.28 If adhesive has not cured for 24 hours, clean and scuff end cap sealing grooves at sleeve seams. Apply additional adhesive to the sleeve seams at the end cap sealing grooves, if none is present.

7.29 Reassemble closure per Section C.

COMPLETE SLEEVE REMOVAL

7.30 Remove sleeve hose clamp(s).

7.31 Heat adhesive to 66° C (150° F.) with a supplementary heat source (hot air gun, infrared lamp). Pull sleeves apart while adhesive is still hot. A sheath knife can also be used on the sleeve seam.

NOTE: Once removed, split sleeves cannot be reused if they have been disassembled.

H. ADHESIVE BONDING OF SPLIT END CAPS

NOTE: Additional hose clamps, not supplied with the kit, are required for each split cable opening and for fastening end cap to sleeve.

PREPARATION

7.32 Measure cap for proper fit on cables and closure sleeve. Bushings, if required, should be split.

7.33 Clean cut surfaces and scuff with SCOTCHCAST 4435 Sheath Scuff. Scuff both inside and outside surfaces of the cap near the cut edge. (Figure 31)

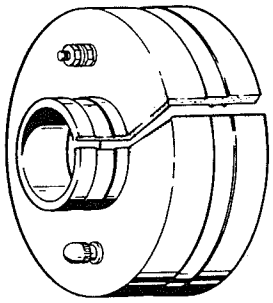


Figure 31. Clean and Scuff Split Area

END CAP ASSEMBLY

7.34 Place cap around cable and sleeve. Offset end cap and split seams.

NOTE: If cap contains factory glued bushings, place a bead of adhesive around the cap/bushing seam on the inside of the cap. Smooth with spatula to remove voids. (Figure 32) This can be done prior to installing cap on cable and closure sleeve.

7.35 Mix adhesive per instructions on guard bag.

7.36 Apply a bead of adhesive onto both surfaces of split end cap and bushing, if present. (Figure 33)

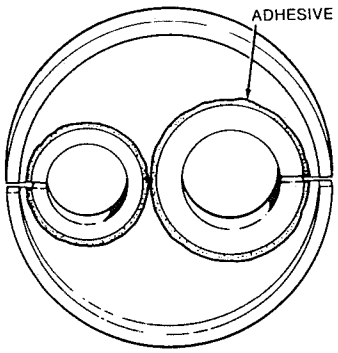



Figure 32. Seal Collars to Cap

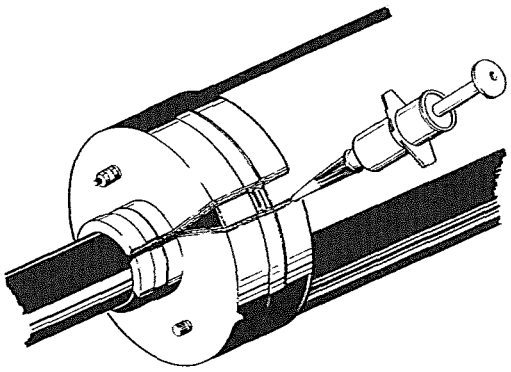


Figure 33. Apply Adhesive

7.37 Fasten hose clamps per Figure 34. Two hose clamps are required to provide uniform split closing.

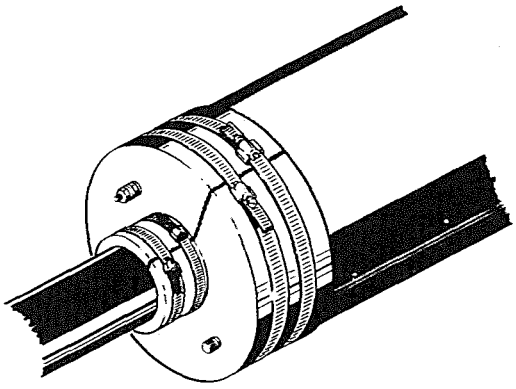


Figure 34. Fasten Hose Clamps

NOTE: Reverse direction of hose clamps to aid in closing of split.

7.38 Flash test closure after 4 hours (see note on adhesive cure time in Section E Flash Testing).

## 8. VAULT CLOSURE REHABILITATION

### 8.01 INTRODUCTION

These instructions describe the procedure for rehabilitating damaged or improperly installed K&B Vault Closures. This rehabilitation procedure includes instructions for inspecting the closures, ordering replacement parts, and replacing the entire closure or any one of its parts. Closures rehabilitated according to the procedures outlined here will comply with flash testing requirements set forth in applicable company practices.

### 8.02 CLOSURE INSPECTION

Start the rehabilitation procedure with a thorough inspection of all closures in the vault to determine which closures need replacing and which new K&B Vault and Riser Splice Components are needed. Flash test each closure to pinpoint leaks and to identify parts that need replacing.

8.03 Closure Support Inspection

Check the closure for proper support. (Figure 35) The supports should be under the sleeve so that the cable is not forced to support the weight of the splice and sleeve.

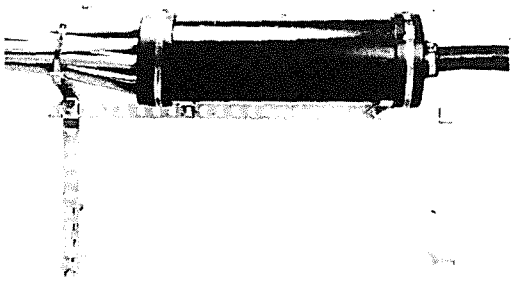


Figure 35. Closure Support

If the closure is not properly supported, note on your worksheet to order a set of RC-100 Rack Clips. RC-100 Rack Clips can be used on both standard vertical manhole racks and Unistrut type racks.

8.04 Collared End Cap (Main Cable) Inspection (Figure 36)

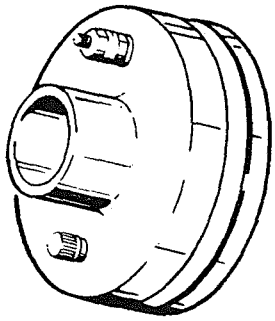


Figure 36. Collared End Cap

Inspect the collared end cap to determine if it is properly sized to fit the entrance cable. The end cap should seal the main cable in an airtight manner.

Measure the main cable's diameter and record it on the worksheet.

The diameter of the collared end cap is stamped on the face of the cap between the sleeve diameter and the number of openings on the cap. For example, if the cap is stamped C9-300-1C, the C9 indicates a 9 inch diameter sleeve; 300 indicates a 3.00 inch diameter opening, and 1C indicates 1 collared opening in the end cap.

Compare the main cable's diameter with the diameter of the opening on the collared end cap. An adequate seal is formed if the diameter of the main cable is a maximum of equal to and a minimum of .25 inches smaller than the collared end cap's opening. If the diameter of the main cable is not within this 1/4 inch.

order a new split collared end cap with the appropriate diameter opening to replace the old cap or appropriate bushings to reduce opening to proper size. Note on your worksheet which component is needed.

NOTE: If rehabilitating a vertical K&B Closure a 5925 Fire Barrier Vault Rehabilitation Kit is available to upgrade the closure to meet the PUB 55006 Flammability requirements.

8.05 Closure Sleeve Inspection (Figure 37)

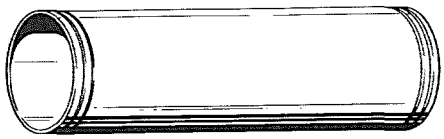


Figure 37. K&B Vault and Riser Closure Sleeve

Examine sleeve for signs of physical damage, such as cracks, out of round, chips, etc. If sleeve is damaged, it must be replaced. Any sleeve which uses a double "H" strip to join the sleeve halves must be replaced.

As you inspect a closure, keep in mind that the diameters of the end caps and the closure sleeve on any one closure must be the same. Therefore, if either of these components changes in size, the other component must also change.

If the splice has been reworked, check the bundle size and length to be sure it will fit back into the sleeve. If the sleeve is too small for the splice bundle, it must be replaced. Note this on worksheet.

NOTE: If a larger diameter sleeve is required, larger diameter end caps are also required.

When sleeves are replaced with split sleeves, KB-S1 adhesive is required to provide a watertight closure.

8.06 Multiple End Cap (Tip Cable) Inspection (Figure 38)

Figure 38. Multiple End Cap

Inspect the multiple end cap to determine if it is properly sealing the tip cables. Measure the diameter of the tip cables and record it on the worksheet.

Like the collared end cap, the diameter of the tip cable openings is stamped on the face of the cap between the sleeve diameter and the number of openings. For example, if the cap is stamped C9-100-27, the C9 indicates a 9 inch diameter sleeve; 100 indicates 1.00 inch diameter openings, and 27 indicates 27 tip cable openings in the cap.

If a leak is identified at the multiple end cap, then rehabilitate the multiple end cap with the following procedure.

Remove the collared end cap and sleeve. Check the inside of the multiple end cap for split nipples. (Figure 39) If any of the nipples have been damaged, the cap must be rehabilitated.

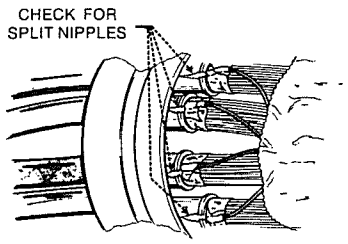



Figure 39. Inspect Nipples.

Make sure plugs have been installed in any unused openings. (Figure 40) If plugs are needed, list the quantity on your worksheet.

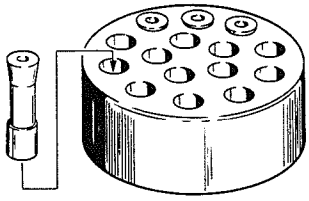


Figure 40. Install Plugs in Unused Openings.

If a multiple end cap is to be rehabilitated, a K&B tip cable rehab kit must be ordered.

8.07 Ordering K&B Splice Closure Components

Once you have collected all data, reassemble the closure. Replacement parts should be ordered from 3M using the information listed on the worksheet. See Section 3 Ordering Information.

Remember:

(a) Thoroughly inspect all components;

(b) Record all your observations as soon as you make them;

(c) End caps and closure sleeves must have the same diameter. If any one of the three components change in size, the remaining two components must also change in size.

8.08 COMPLETE CLOSURE REHABILITATION

This section describes the procedure for rehabilitating a K&B Vault and Riser Splice Closure when the entire closure (collared end caps, sleeve, and multiple end cap) must be replaced. Keep in mind that although this procedure will illustrate the replacement of all component parts, there are times when only one or two will need replacement. Replacement of each individual part may be accomplished according to the appropriate portion of this procedure.

The K&B Vault and Riser Splice Closure Components required are:

- Split Sleeve Set
- One Split Collared End Cap
- KB-S1 Vault Closure Sealing Kit

Additional materials required are:

- K&B Tip Cable Rehab Kit
- RC-100 Rack Clips
- 26 Inch Cable Ties
- Protective Gloves
- 5925 Fire Barrier Vault Rehabilitation Kit (for vertical closures)

8.09 Collared End Cap and Split Sleeve Assembly

Refer to Section 7 for sealing split sleeves and end caps.

8.10 Multiple End Cap Rehabilitation

Start the procedure by properly supporting the closure.

Arrange the tip cables leaving about 12 inches of free tip cable.

Remove the hose clamp on the multiple end cap. (Figure 41)

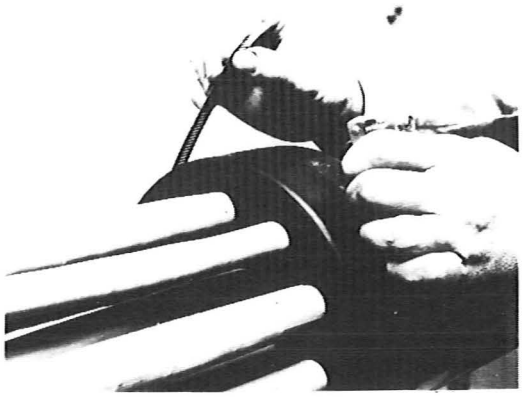


Figure 41. Remove Hose Clamp

Clean the surface of the cap and about 6 inches of the tip cables with a SCOTCHCAST Brand 4415 Cleaning Pad. (Figure 42) Be sure to clean off all soap or pressure testing solution and any other foreign materials. Do not wipe dry.

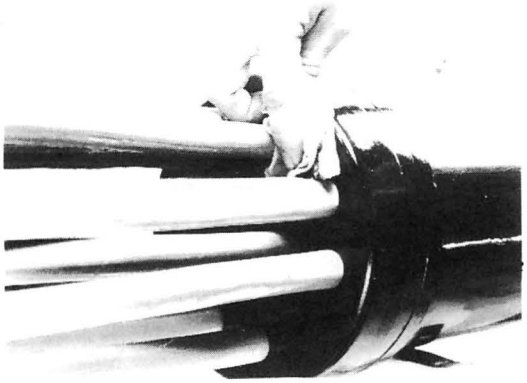


Figure 42. Clean Cap and Tip Cables

Reset the cap making sure it is firmly seated.

When the multiple end cap opening is much larger than the tip cable, insert a 1/2 inch X 3/8 inch foam strip (cut to the circumference of the tip cable) into the opening to prevent foam from running down the tip cables and into the closure. (Figure 43) Push the foam strips as far back into the opening as possible.

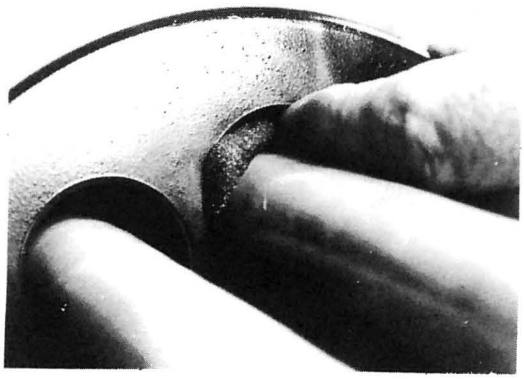


Figure 43. Insert Foam Strips Into Tip Cable Openings

Place foam blocks between all tip cables about 2 inches from the cap. (Figure 44) Be sure that the tip cables aren't touching each other. Use enough blocks to fill all voids.

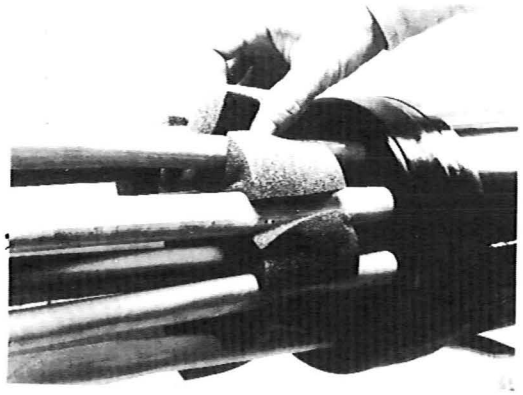


Figure 44. Place Foam Blocks Between Tip Cables

Place the foam strip around the blocks and build a collar 1 inch higher than the outside diameter of the multiple end cap. (Figure 45) Secure the foam collar in place with a cable tie. Pull the tie tight enough to form a 3/4 inch to 1 inch deep "V" in the center of the foam. (Figure 46)

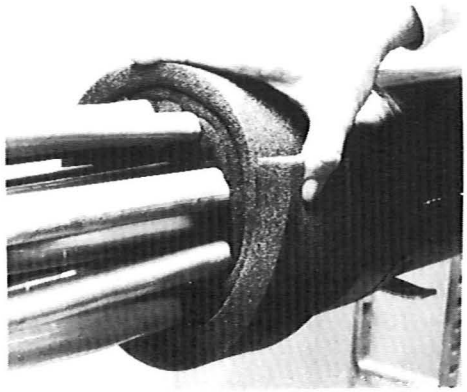


Figure 45. Build Collar With Foam Strip

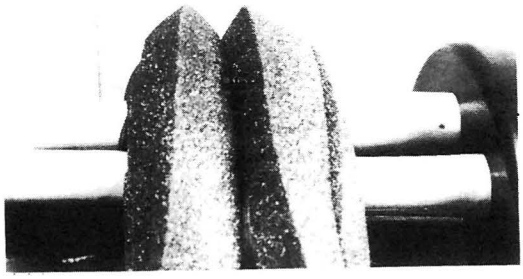


Figure 46. Hold Foam in Place With a Cable Tie

Place the PVC sleeve around the tip cable and cut to length to allow 3 inches of overlap when in final position and secure in the center with a hose clamp. (Figure 47) The PVC sleeve should be even with the edge of the hose clamp groove closest to the sleeve. The other end should rest on the foam collar. The seam of the PVC sleeve should be on the bottom of the splice. Keep in mind that this hose clamp is temporary and must be moved around as you complete the taping procedure.

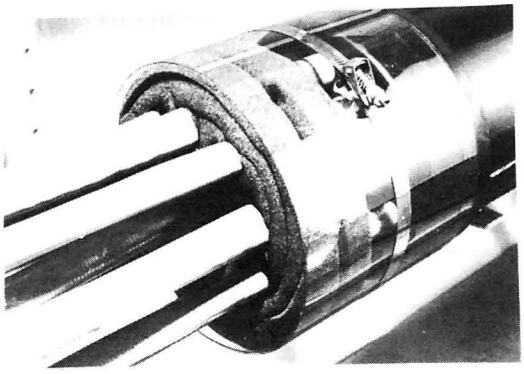


Figure 47. Place PVC Sleeve Around Tip Cables

Tape the sleeve as follows:

(a) Place a double wrap of 1-1/2 inch vinyl tape around the sleeve and multiple end cap as shown in Figure 48.

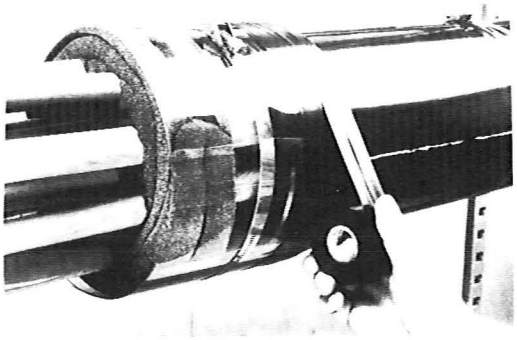


Figure 48. Tape Around End Cap and Sleeve

(b) Tape the outer end of the sleeve as shown, being sure to overwrap the foam. (Figure 49)

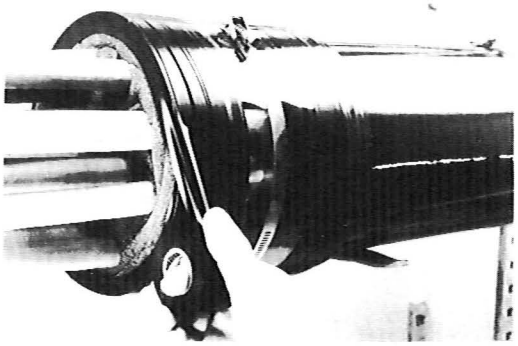


Figure 49. Tape Around Sleeve and Foam Collar

(c) Move the hose clamp into position over the multiple end cap and leave a "window" area about 1/2 inch from the face edge of the cap. (Figure 50) This will provide you with a means of visually checking the flow of foam within the sleeve.

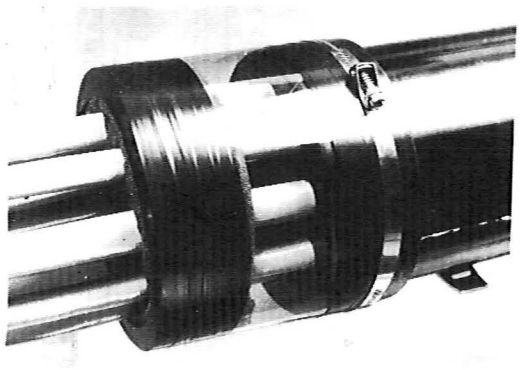


Figure 50. Window in Sleeve

Cut a 1 inch "X" in the "window" of the sleeve about 1/2 inch from the end of the multiple end cap. (Figure 51) This is the point where the compound will be injected into the sleeve.

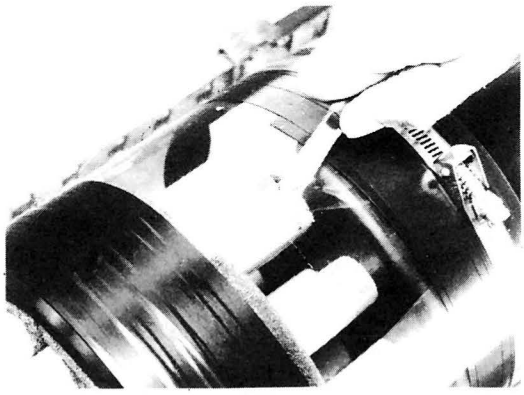


Figure 51. Cut "X" in Window in Sleeve

The expanding foam should be mixed according to the instructions on the bag. Inject the foam quickly into the sleeve. See Table H for the correct number of bags of foam needed for the size of closure you're working on.

TABLE H

| END CAP DIAMETER | NO. OF TIP CABLES | NO. OF 6-1/2 OZ. BAGS |
|---|---|---|
| 5" | 6 | 2 |
| 6" | 9 | 2 |
| 7" | 12 | 2 |
| 8" | 18 | 3 |
| 9" | 24-27 | 3 |
| 10" | 27-30 | 4 |
| 12" | 30+ | 4 |

Apply strips of 1 and 1/2 inch vinyl tape over the opening when the compound begins expanding. (Figure 52) To allow the foam to thoroughly set up, do not disturb the splice for at least one hour.

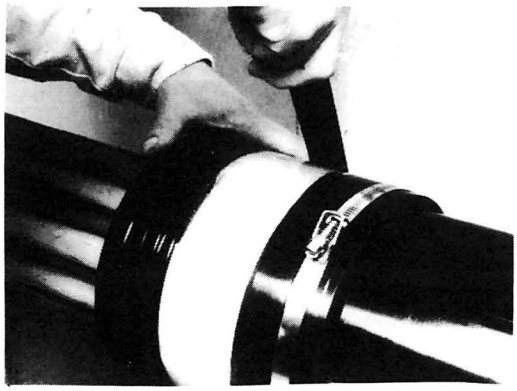


Figure 52. Overwrap Opening in Sleeve

## 8.11 5925 Fire Barrier Vault Rehabilitation Kit

This section describes the procedure for installing the 5925 Kit when it is to be used in conjunction with an existing vertically installed K&B Vault Closure when required to meet specific fire retardancy requirements such as the Bell System Technical Reference PUB 55006 (Issue 1, Section 5.53).

The components are:

One (1) roll 11-3/4 inch x 12 foot Fire Barrier Foil Matt
One (1) roll 1 inch x 36 yards No. 27 Glass Cloth Tape

(a) Cut section of Fire Barrier Foil Matt 12 inches long.

(b) Wrap Foil Matt section around lower vault closure entrance cable, butting the matt against the lower closure end cap. Foil side must face outward.

(c) Tape foil matt securely in place with No. 27 Tape. (See Figure 53)

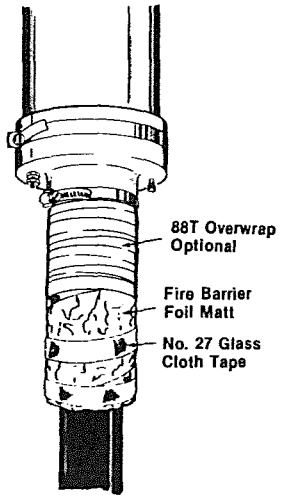



Figure 53. Tape Foil Matt Securely in Place

(d) Overwrap installed Fire Barrier with black vinyl tape (Scotch Brand 88T or equivalent) for appearance if desired.

## 8.12 FLASH TESTING

Flash testing can begin after the entire closure has remained undisturbed for 4 hours to allow the adhesive to cure.

After 4 hours, re-tighten all hose clamps.

Flash test the closure with 2 to 8 psi. Apply pressure testing solution to all seams and look for leaks.

If leaks are observed along a seam, apply additional KB-S1 adhesive to the spot. The adhesive must be allowed to cure for 4 hours before the closure can be flash tested again.

If no leaks are observed, release pressure and install valve cap. Install pressure seal as shown in paragraph 4.35.

Check the closure for proper support. Supports should be under the sleeve so the cable is not forced to support the weight of the splice and sleeve.