

CABLE PRESSURE SYSTEMS

BUFFERING

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defined in this section arise, contact the local maintenance supervisor for assistance.

Reference Material (Safety)

1.08 To safely perform the procedures outlined in this section, the employee must be familiar with the information contained in the following sections and subdivisions:

| SECTION | TITLE |
|--------------------|--|
| 620-102-010 | Outside Plant—Precautions— Underground and Buried Work |
| 620-135-010 | Guarding Work Areas |
| 620-135-100 | Outside Plant—Guarding Work Areas—Standard Warning Devices—Description and Use |
| 620-140-501 | Testing and Ventilating Manholes |
| 620-150-010 | Manhole Covers—Removing and Replacing |
| SUBDIVISION | |
| 081-700- | Gas Detecting Devices |
| 649-510- | Blowers and Heaters |
| 649-530- | Portable Pumps and Saws. |

2. PROCEDURES FOR BUFFERING CABLES PRESSURIZED BY A NONPIPE SYSTEM

Underground and Buried Cables

2.01 It is recommended that dry air be added to pressurized underground or buried cables prior to making a cable opening if the cable is *not* pneumatically supported by an air pipe. The dry air should be supplied from auxiliary air sources at convenient manholes or valve locations within 1500 to 4500 feet on each side of the opening.

2.02 If the opened cable terminates or leaves the pressurized section as a branch or lateral, an air source must be placed at the far end of the pressurized branch or lateral to maintain its pressure.

2.03 When an opening must be made within 1500 feet of a CO and it is determined that the opening will cause an excessive loss of air and/or overload the pressure source, the cable to be opened should be disconnected from the pressure source at the CO. Prior to disconnection, an air source must be placed at a manhole or valve location at least 1500 feet on the field side of the opening and at the cable entrance facility (CO vault). Air sources located less than 1500 feet from an opening will result in a high rate of air usage, with little increase in cable pressure.

Note: Auxiliary air sources may be a truck equipped with a dry air source, a portable air dryer, or nitrogen cylinders. Only air sources equipped with moisture alarm features shall be used (excluding nitrogen cylinders). An audible or visual moisture alarm which can be used during work operation is satisfactory.

2.04 Prior to opening a cable to be buffered, measure the pressure in the cable with a C pressure gauge or equivalent. If the cable pressure is below the minimum established pressure level, contact the supervisor responsible for pressurization and obtain additional buffering instructions before proceeding with work operations.

2.05 Connect a hose from the air source to an F pressure testing valve at the buffering locations. If the cable at the buffering location is not equipped with an F pressure testing valve, one should be installed as described in Section 637-235-201.

2.06 Immediately after opening the sheath, and where the splice bundle permits, a tightly wrapped rubber bandage shall be placed around the cable core at each end of the opening and extended along the sheath on each side of the opening. Several wraps shall be made around the cable so that the core is sufficiently constricted to minimize the loss of air at the sheath opening.

2.07 When work is completed or terminated for the day, perform the following operations:

- (a) Obtain a closing number from the test center in the same manner discussed in paragraph 1.06.
- (b) Remove the constricting rubber bandage and close the sheath opening.

- (c) Pressure test the sheath closure, *depending on the type*, as outlined in the 633 Division of the Bell System Practices.
- (d) Continue buffering until the cable pressure at the sheath closure (permanent type) reaches approximately 1/2 pound of the preopening pressure.
- (e) Remove auxiliary air sources, buffering connectors, and buffering tags after the cable pressure at the sheath opening has been restored.
- (f) Restore all valves, which control pressure, to their prior position.
- (g) If it is determined that activity will continue for an extended period (one week or more), it is recommended that a G transducer be installed temporarily to monitor the pressure in the splice during unattended periods. This transducer should be removed upon completion of the job.

Aerial Cables

2.08 When a sheath or splice opening is made in an aerial cable, no buffering is required if the job is to be completed in one day and no rain is forecast. If the job is expected to extend beyond one day and/or rain is forecast, an air source should be connected to the cable at locations approximately 1500 to 4500 feet on each side of the opening in the same manner as for underground or buried cable.

Aerial-Underground Combination

2.09 Where an opening is to be made in the aerial section of a combination aerial-underground cable section, either of the following two methods may be used:

- (1) Buffer on each side of the opening in the same manner as for underground or buried cable.
- (2) If a bypass valve exists between the junction of the aerial and underground cables, close the valve and connect an air source 1500 feet beyond the opening. The air from the source should be applied at a pressure of 5 psig.

3. PROCEDURES FOR BUFFERING CABLES PRESSURIZED BY A PIPE SYSTEM

General

- 3.01** When entering an underground cable, the airpipe which feeds that cable should be buffered at the location where the work is being performed.
- 3.02** Prior to opening an underground cable, measure the cable pressure and the pressure of the pipe to be buffered using a C pressure gauge or equivalent. If the minimum established pressure levels are not present, contact the supervisor responsible for pressurization and obtain additional buffering instructions before proceeding with work operations.
- 3.03** Connect a hose from the auxiliary air source to an F pressure testing valve on the pipe at the buffering location. If the pipe at the buffering location is not equipped with an F pressure testing valve, one should be installed as described in Section 637-050-200.

Note: Auxiliary air sources may be a truck equipped with a dry air source, a portable air dryer, or nitrogen cylinder. Only air sources equipped with moisture alarm features shall be used (excluding nitrogen cylinders). An audible or visual moisture alarm which can be used during work operation is satisfactory.

- 3.04** Advance the pressure source regulator until an increase in pipe pressure of approximately one-half pound above existing pressure is observed on the auxiliary air source regulator gauge.
- 3.05** After opening the sheath or splice, wrap the ends of the opening as described in paragraph 2.06.
- 3.06** During the course of work operations, periodically observe the pipe pressure. If a pipe pressure reduction occurs, reestablish a level of one-half pound above the original pipe pressure level by increasing the source regulator pressure.
- 3.07** When work is completed or terminated for the day, perform the following operations:
 - (a) Obtain a closing number from the test center as outlined in Section 620-020-005.

- (b) Remove the constricting rubber bandage and close the sheath opening.
- (c) Remove the auxiliary air source from the air pipe.
- (d) Pressure test the sheath closure, depending on type, as outlined in the 633 Division of the Bell System Practices.

Note: In the event the cable is stubbed through a nonplug stub to other cables which are pressurized through a manifold, the shutoff valve to these cables must also be closed. If these cables are fed from different pipe, that pipe should also be buffered.

3.09 Attach the auxiliary air source to the manifold assembly at the location shown in Fig. 1.

Sheath Opening at Manifold Manhole

3.08 If a splice opening is to be made in a manifold manhole, the shutoff valve feeding the cable to be opened **must be closed**.

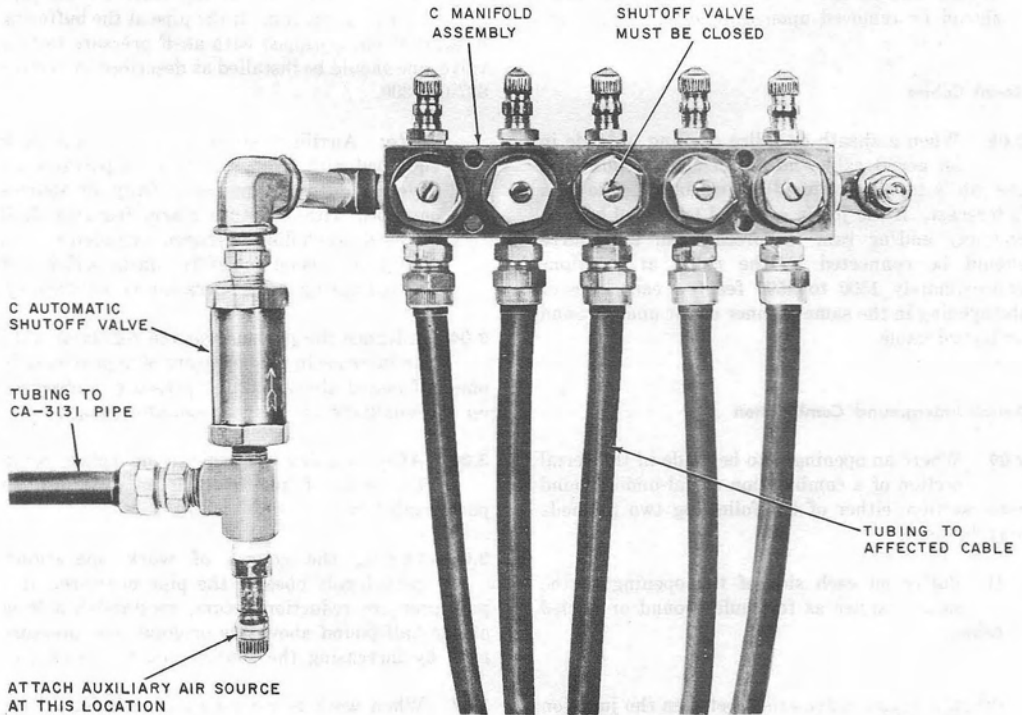


Fig. 1—Arrangement at Manifold Manhole

3.10 If the splice opening is to be made in a cable fed by two pipes, it may be necessary to buffer both pipes (Fig. 2, Splice 1).

3.11 Upon completion of the work operations, ensure that all manifold shutoff valves are returned to their original position; also perform the steps outlined in paragraph 3.07.

Aerial Pipe Systems

3.12 When a sheath or splice opening is made in an aerial cable which parallels an aerial pipe and is fed directly by such pipe, buffering is recommended subject to the following considerations:

- (a) No buffering is required when the pressure in the affected cable is 2 psig or more.
- (b) When pressure is less than 2 psig, buffer the cable, depending on opening location, as described in paragraphs 3.08 through 3.11.

Beyond a Pipe System

3.13 When an opening is made at or beyond the termination of the pipe system, an air source must be connected to the pressurized cable 1500 feet beyond the opening or at the cable end.

4. SUPPLEMENTARY BUFFERING

4.01 Supplementary buffering over and above the normal outlined above shall be applied to an **air pipe** if the following conditions exist:

- (a) A splice opening is made in a manhole which does not contain the air pipe affected by the opened cable. See Fig. 2, Splice 2 and 3.

Note: Connect the air source (10 psig) to the affected air pipe at the location outlined in the buffering information supplied by Outside Plant Engineering.

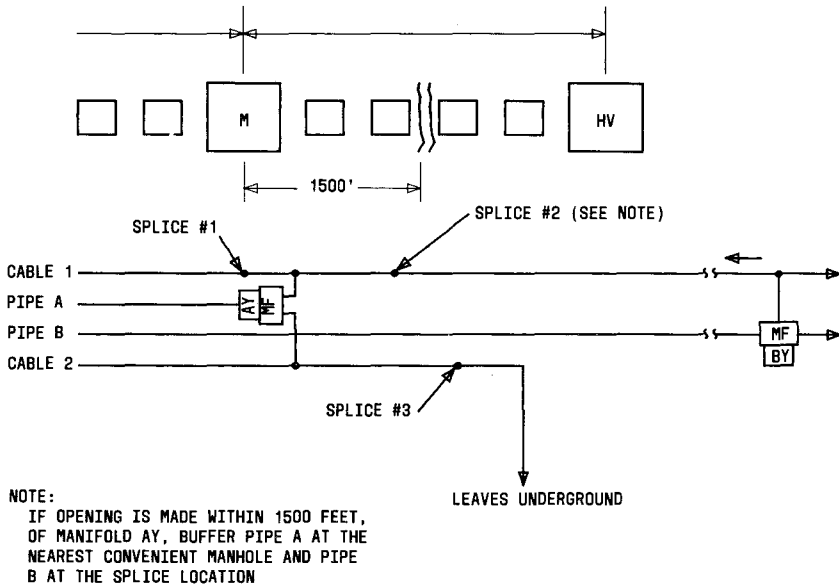


Fig. 2—Sheath Opening Locations

4.02 Supplementary buffering shall be applied to the **cable** if any of the following conditions exist:

- (a) The cable ends or leaves the conduit run between manifolds (cable isolated from air source when splice is opened). See Fig. 2, Splice 3.
- (b) The cable opening is made at or beyond the last manifold.

Note: When cable exceeds 500 feet in length, supplementary buffering must be applied. This buffering shall be applied at a convenient location approximately 1500-feet beyond the sheath opening or at cable end if less than 1500 feet. When less than 500 feet in length, effective buffering cannot be provided. Special provisions may be made to provide token buffering when an abnormal number of special services appear in the cable to be opened.

4.03 No supplementary buffering will be required when a cable enters a building from a manhole without passing through intermediate manholes and/or does not exit from ground before reaching the building.♦

5. ARRANGEMENTS FOR SUBMARINE CABLE

5.01 Since the pressure required to prevent moisture entry in the event of a sheath fault

in deep water would result in excessive sheath and sleeve stresses in the land portion, submarine cables normally are maintained at the same pressure as the connecting sections of cables located on land. Protection against the entrance of moisture is provided only for the land ends and that portion of the submarine cable in shallow waters.

5.02 When a sheath opening is to be made in a submarine cable, close the bypass valves at the junction plugs between the submarine cable and the land portions and connect an auxiliary air source to the submarine cable at each end of the crossing.

Note: Although the auxiliary air source should be adjusted to maintain a 10-pound pressure in the cable, pressures **up to 15 pounds** may be used if necessary.

5.03 After the sheath opening has been closed, flash tested, and restored to its normal location, continue admitting air until the preopening pressure is obtained; then, open the bypass valves at the junction plugs.

Note: If pressures above 10 pounds were employed, the excess pressure should be released from the submarine cable before the bypass valves are opened.