

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

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PRESSURE TESTING

MAINTAINING CABLES UNDER PRESSURE

SHEATH OPENINGS

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1. GENERAL

1.01 This is a new section which describes the procedures to be followed to maintain pressure and protect service when sheath or splice openings are made in cables maintained under continuous pressure.

1.02 When sheath or splice openings are made in a cable under pressure, there is a loss of gas to the atmosphere which, if continued for more than several hours, may result in the following conditions:

- (a) A reduction of average pressure to a low value which would permit moisture to enter the cable in case a leak exists or occurs in the gas section.
- (b) A reduction of pressure to a value below contactor operating pressure causing the operation of one or more contactors.
- (c) A reduction of average pressure sufficient to require immediate charging of the section when the opening is closed.

1.03 Except when a cable is to be open for only a short period of time, such as for minor repairs or testing operations, gas should be added to the cable during the time

the cable is open, by cylinders of gas located on each side of the opening. This is done to maintain adequate pressure in the section and provide satisfactory protection of service. The procedures to be followed for the various types of plant are as follows:

2. PROCEDURE WHEN SHEATH OPENINGS ARE MADE IN UNDERGROUND OR BURIED CABLE

2.01 When sheath or sleeve openings are to be made on an underground cable, gas should be added to the cable by cylinders located in convenient manholes 1,000 to 3,000 feet on each side of the opening. On buried cable, connect the cylinders at regular valve points 1,000 to 4,000 feet on each side of the opening. Cylinders located less than about 1,000 feet from an opening will result in a high rate of gas usage with little improvement in protection to the cable.

2.02 Adjust the regulator pressure under a no flow condition to read the same as the measured cable pressure prior to opening the sheath. The regulator pressure should not be less than one pound above contactor operating pressure.

2.03 After the work is completed and the sheath opening has been closed, continue admitting gas at the same regulator setting until the cable pressure measured at the point of opening has reached a value within about one-half pound of the regulated pressure at the cylinders.

3. PROCEDURE WHEN SHEATH OPENINGS ARE MADE IN AERIAL CABLE

3.01 When sheath or sleeve openings are to be made on an aerial cable during wet weather, including fog, gas should be added to the cable on each side of the opening in the same manner as for underground or buried cable. Choose convenient poles 1,000 to 3,000 feet from the opening for connecting the cylinders.

3.02 During dry weather, either the above procedure may be followed or the gas may be allowed to escape from the cable and the section recharged after all sheath openings have been closed. In this case, the operation of the alarm system will be suspended until the cable has been recharged to normal operating pressure.

3.03 When an opening is to be made in an aerial cable in a combination aerial-underground section, either add gas on each side of the opening in the same manner as for underground cable or close the by-pass valve at the junction plugs between the aerial and underground plant in order to

maintain normal pressure in the underground portion. In the latter case, a cylinder of gas with regulator adjusted to the measured cable pressure should be connected to the underground portion whenever the length of gas section containing the underground cable is reduced to less than about 25,000 feet.

4. SPECIAL ARRANGEMENTS FOR SUBMARINE CABLE

4.01 Submarine cable is often placed in depths of water where maintenance of pressure at sufficiently high values to keep out moisture in the event of a sheath fault in deep water is impractical because it would result in excessive sheath and sleeve stresses near shore and in the land portions. Consequently, the submarine cable portions of gas sections are normally maintained at the same pressure as the land cable. Protection against the entrance of moisture is thus obtained only on the land and in the shallower portions of the submarine cable on the basis that a pressure of one pound is equivalent to a two-foot head of water.

4.02 When a sheath opening is to be made in a submarine cable, close the by-pass valves at the junction plugs between the submarine cable and the land portions and admit gas to the submarine cable by cylinders connected at each end of the submarine crossing.

4.03 Normally, the regulator should be adjusted to maintain a ten-pound pressure in the cable. However, a higher pressure, **not to exceed 20 pounds**, may be used where necessary. Continuous cable pressures in excess of 20 pounds may result in damage to the plug and to the sheath of the submarine cable where the armor has been removed or has been weakened or destroyed by corrosion.

4.04 After the sheath opening has been closed and the submarine cable restored to its normal location, continue admitting gas until the cable has been recharged to its normal operating pressure. Then open the by-pass valves at the junction plugs. If pressures above 10 pounds have been employed, the excess pressure should be released from the cable and from the air space in the top portion of the junction plugs.

4.05 When closing of the by-pass valves at the ends of the submarine cable results in gas section lengths in the land portion of less than about 25,000 feet, a cylinder of gas should be connected to the short gas sections with regulator adjusted to the measured cable pressure.