

**BELL SYSTEM PRACTICES**  
**Outside Plant Construction**  
**and Maintenance**

**SECTION G73.225.2**  
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**AT&T Co Standard**

## **PRESSURE TESTING**

### **CONSTRUCTION TESTS**

### **PROCEDURE DURING PLACING**

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#### **1. GENERAL**

1.01 This section describes the construction tests to be made on individual lengths of cable, load coil cases, terminals and other items of material at the store yard and before and after placing operations. This section replaces the related information in Section G73.225, Issue 1, which is cancelled.

1.02 A single reel or length of cable contains a relatively small amount of gas. Even a very small leak will, therefore, produce a readily observable drop in pressure in a short time. The presence of the leak can be detected most readily by comparative pressure readings made before the length is spliced. Also, the small volume of gas in a single length affords only limited protection against moisture troubles.

1.03 Because of their subsurface location, buried, underground, and submarine cables are particularly subject to moisture trouble in the event of a leak. In addition, they are not readily accessible for sheath repair after placing. It is, therefore, advisable to test such cables for gas tightness, and to locate existing leaks before placing. It is also advisable to make additional tests to determine if any leaks are introduced during placing, so that protective measures can be taken if required.

1.04 Aerial cable, on the other hand, is not subject to submersion and is less likely to develop moisture trouble. Since aerial cable is accessible for repair operations, a limited testing procedure is specified.

1.05 In general, when testing lengths of cable, any leak that is large enough to cause a pressure loss of .25 pound or more per month in a 10-mile gas section should be located and cleared. The following table indicates the pressure loss per month in a completed gas section which would result from different size leaks in various lengths of cable. The size of leak is measured by the number of days required to produce a pressure loss of one pound in cable lengths of 500 to 6000 feet.

Pressure Loss per Month in 10-Mile Gas Section	Size of Leak				
	Days for Leak to Produce a Pressure Loss of One Pound in				
	Cable Length				Loading Section
	500'	1000'	1500'	3000'	6000'
.50 lb.	1/2 day	1 day	1-1/2 days	3 days	6 days
.25 "	1	2	3	6	12
.10 "	2	5	7	15	30
.05 "	5	10	15	30	60

1.06 The foregoing table assumes that the total loss in the 10-mile section is due to a leak in one cable length. If more than one of the cable lengths has a leak that causes a loss approaching the .25 pound limit indicated above, their combined effect may result in an excessive total loss in the completed gas section.

## 2. LOADING COIL CASES, TERMINALS, ETC.

2.01 All load coil and apparatus cases are charged with gas at the factory to the equivalent of 9 pounds pressure at 60°F. Other gastight equipment, such as contactors, contactor-terminals, and 37-type terminals, may be charged to an equivalent of 9 pounds at 60°F. in the storeroom if not received from the supplier under pressure.

2.02 Measure the pressure of all cases, terminals and other items in the storeroom and record these measurements for future reference. On cases charged locally, at least 3 days should elapse before the pressure is remeasured. The pressure loss should not exceed about 4 pounds between measurements.

2.03 As a further check on the soundness of the stub cable and case, keep the unit under pressure until the stub cable is opened for splicing. Measure the pressure several days before placing and just before opening the stub cable for splicing and compare these readings with previous readings. All readings should be corrected for temperature, barometer and altitude before comparison with other readings.

2.04 When a leak is indicated, recharge the case or terminal and solution test the end seal and stub. In most instances, the leak will be found in this operation.

2.05 If the leak is not found in the end seal or stub, solution test the case or submerge the case in a tank of water. When a leak is found, the item should be repaired or replaced. Repair methods for various items of material are outlined in other sections.

### **3. BURIED CABLE**

3.01 Buried cable placed under pressure at the factory is charged to the equivalent of about 10 pounds per square inch at 60° F. and 30 in. barometric pressure. Both ends of each reel or splicing length of cable are equipped with valves. The final pressure reading made at the factory, temperature, barometer reading and date of reading is recorded on a tag attached to the cable or reel.

3.02 The pressure and temperature readings should be made and recorded for each splicing length at the cable yard or unloading point far enough in advance of the reel spotting so that repairs can be made if necessary. If practical, this reading should be made immediately after delivery to permit repair of any defect before cable conductors become wet. Barometric pressure and altitude in the vicinity should also be obtained and recorded. These data should be available to the foreman doing the placing work. If there are two splicing lengths on a reel, the pressure of the outer length can not be read without unlagging the reel. Readings on outer lengths may be omitted at this time.

3.03 If the corrected reading made at the cable yard or unloading point is within two pounds of the corrected factory reading, the length is satisfactory for spotting. If the loss is more than two pounds, solution test the end seal on the inner end of the reel, adding gas if necessary to provide satisfactory pressure. Experience has indicated that the majority of the leaks found in reel lengths before they are placed, are in the end seals. If the leak is found, repair it, recharge the cable, and if time permits, make check readings before the reel is spotted.

3.04 If the leak is not found at the inner end and there are several lengths with unlocated leaks in one store yard, it may be desirable to jack up the reels and temporarily unlag them for further tests before spotting.

3.05 If this is done, first test the end seal on the outer end of the defective length. If two lengths are on the reel, it will be necessary to run the outer length onto another reel to get at the defective length. The pressure of the outer length should, of course, be checked as soon as the reel is unlagged.

3.06 If the end seal on the outer end of the defective length is satisfactory, add gas as required, and slowly run the defective length onto an auxiliary reel through a trough containing water, watching for bubbles which will indicate gas leakage. Since the air escaping from pockets in the sheath covering will cause some bubbling, the submersion should be long enough to insure that any bubbling observed is not from this source. When located, the leak should be repaired and the protective covering restored as outlined in other sections.

3.07 Pressure readings should be made and recorded when the reel is unlagged for placing. This reading will serve as a check against pressure readings made in the store yard. Also, at this time, the pressure in the outer length of any reel carrying two lengths should be taken. If the corrected reading is within two pounds of the corrected factory reading, the length is satisfactory for placing. If the loss in pressure is more than two pounds, the leak should be located and repaired before placing, if practicable.

3.08 If a leak occurs due to handling and spotting, and it is not advisable to delay placing, the cable length should be placed and the ends immediately exposed. Test the end seals and, if the trouble is found, repair and recharge the cable. If the leak is not found, it will be necessary to locate the leak by pressure gradient, such as the three-section method described in another section of this group.

3.09 A pressure reading should be made immediately after placing. When placed by plow, this reading should be taken at the time the plow train is stopped to overlap the next cable length. This reading will indicate only large leaks developed in placing. If a leak is indicated by a pressure drop, the cable ends should be exposed and the cable protected by adding gas until the leak can be located and repaired.

3.10 Under favorable conditions, no further pressure measurements will be required until the cable is opened for splicing. A small leak developed in the placing operation, however, would generally not be apparent from readings taken as

outlined in Paragraph 3.09. Leaks of this size may result in moisture penetration when the cable length involved is in a river, swamp or other location where similar water conditions exist. Under these circumstances, an additional pressure reading is suggested approximately 24 hours after the cable is placed. If the difference between this reading and the reading taken in accordance with Paragraph 3.09 exceeds one pound, steps should preferably be taken to clear the leak immediately. If the pressure difference is less than one pound, clearance of the leak can be deferred as much as a week without endangering the cable.

3.11 A small leak, but one sufficiently large to permit moisture penetration, may not be evident from gauge readings for several days. Under the circumstances outlined in Paragraph 3.10, therefore, a second reading is suggested where the interval between placing and splicing exceeds 5 or 6 days. When leaks are indicated prior to splicing, the three-section method can be followed to locate them.

3.12 When the interval between placing and splicing exceeds two weeks, check measurements are desirable for all unspliced lengths two weeks after placing and thereafter at intervals of one month, to reduce the danger of having lengths of cable unprotected by gas pressure.

#### **4. SUBMARINE CABLE**

4.01 Submarine cable should be tested as outlined for buried cable.

4.02 In view of the difficulties of locating and clearing leaks in submarine cable after it is placed, sufficient time should be allowed after spotting to obtain pressure readings which will insure the gastightness of the cable.

4.03 If possible, sufficient time should also be allowed for adequate pressure readings to be made and recorded after the cable is placed and before it is spliced, to be certain no damage occurred during placing.

#### **5. UNDERGROUND CABLE IN CONDUIT**

5.01 The pressure tests to be made on underground cable shipped under pressure correspond, in general, to those outlined for buried cable.

5.02 Measure and record the gas pressure on such cables while the reels are in the store yard as outlined in Paragraph 3.02. In the event the pressure readings are not made while the reels are in the store yard (such as where two lengths

of cable are on the same reel), they should be made before the cable is pulled into the duct as outlined for buried cable in Paragraph 3.07.

5.03 Pressure measurements should be made as soon as possible after a reel length is pulled in, to be certain no large leak develops during the placing operation. In order to preclude the necessity for entering the manhole for subsequent pressure measurements, the cable ends can be raised and secured so that the valves are accessible from the manhole opening.

5.04 Since underground cable in conduit is readily accessible at manholes for pressure measurements, the tests suggested in Paragraphs 3.10, 3.11 and 3.12 should be made if more than a week will elapse between cable placing and splicing, to ensure that no small leaks were introduced in the placing operation.

5.05 When a leak is detected in a length of underground cable after it has been pulled into the duct, and tests show that the leak is not due to a defective valve or end seal, connect a cylinder of gas to the section until remedial measures can be carried out. Consideration should be given to obtaining an accurate location by pressure gradient methods and digging to clear the leak, or pulling the cable out of the duct and solution testing or running it through water until the leak is found.

## **6. AERIAL CABLE**

6.01 Aerial cable is not ordinarily ordered shipped under pressure; pressure tests before and after placing operations are not required.

6.02 Aerial cable that is to be maintained under continuous pressure should be pressure tested during splicing operations as outlined in another section.