(7) *Applicable results.* The PJ for both trunk and nonloaded subscriber loop circuits in the 4–300 Hz frequency band shall not exceed 6.5° p-p. The PJ for both trunk and nonloaded subscriber loop circuits in the 20–300 Hz frequency band shall not exceed 10.0° p-p.

(8) *Data record.* The measurement data shall be recorded. Suggested formats similar to Format VI for nonloaded subscriber loops and Format VII for trunk circuits in §1755.407 or formats specified in the applicable construction contract may be used.

(9) *Probable causes for nonconformance.* Some of the causes for failing to obtain the desired results may be due to excessive S/CNN, impulse noise, and amplitude jitter.

(g) *Impulse noise measurement.* (1) When specified by the borrower, impulse noise measurements shall be made on trunk circuits and nonloaded subscriber loops. For trunk circuits, the measurement shall be made between CO locations. For nonloaded subscriber loops, the measurement shall be made from the CO to the station protector of the NID at the customer's access location.

(2) Impulse noise is a measure of the presence of unusually large noise excursions of short duration that are beyond the normal background noise levels on a facility. Impulse noise is typically measured by counting the number of occurrences beyond a particular noise reference threshold in a given time interval. The noise reference level is C-message weighted.

(3) *Method of measurement.* The impulse noise measurement shall be performed using a 1,004 Hz tone at –13 dBm0 and in accordance with ANSI T1.506–1990 and ANSI/IEEE 743–1984.

(4) *Test equipment.* The equipment for performing the measurement shall be in accordance with ANSI/IEEE 743–1984.

(5) *Applicable results.* The impulse noise for both trunk and nonloaded subscriber loop circuits shall not exceed 65 dBrnC0 (decibels relative to one picowatt reference noise level, measured with C-message frequency weighting, referred to a zero transmission level point). The impulse noise requirement shall be based upon a maximum of 5 counts in a 5 minute period at equal to or greater than the indicated noise thresholds.

(6) *Data record.* The measurement data shall be recorded. Suggested formats similar to Format VI for nonloaded subscriber loops and Format VII for trunk circuits in §1755.407 or formats specified in the applicable construction contract may be used.

(7) *Probable causes for nonconformance.* Some of the causes for failing to obtain the desired results may be due to excessive transient signals originating from the various switching operations.

[62 FR 23996, May 2, 1997, as amended at 69 FR 18803, Apr. 9, 2004]

§1755.406 Shield or armor ground resistance measurements.

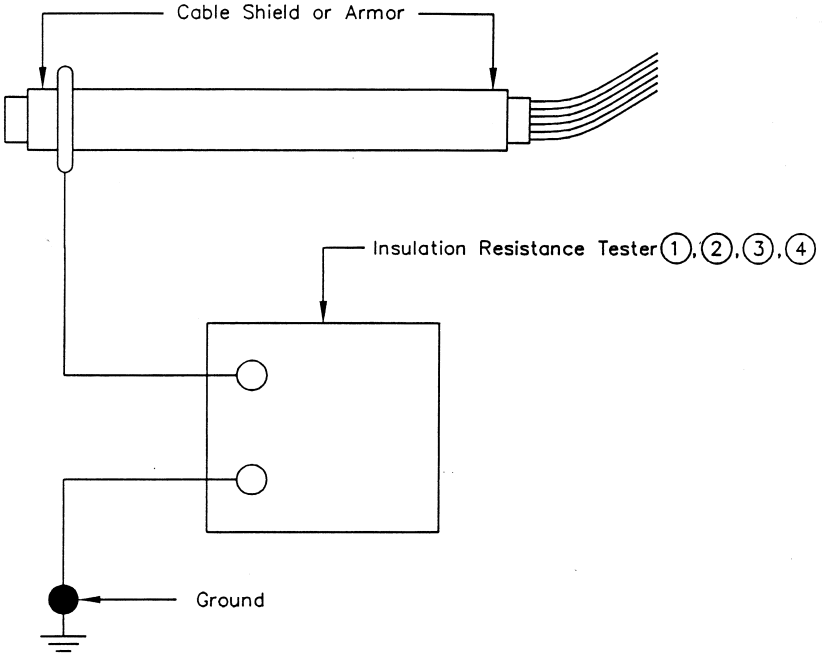
(a) Shield or armor ground resistance measurements shall be made on completed lengths of copper cable and wire plant and fiber optic cable plant.

(b) *Method of measurement.* (1) The shield or armor ground resistance measurement shall be made between the copper cable and wire shield and ground and between the fiber optic cable armor and ground, respectively. The measurement shall be made either on cable and wire lengths before splicing and before any ground connections are made to the cable or wire shields or armors. Optionally, the measurement may be made on cable and wire lengths after splicing, but all ground connections must be removed from the section under test.

(2) The method of measurement using either an insulation resistance test set or a dc bridge type megohmmeter shall be as shown in Figure 18 as follows:

FIGURE 18

SHIELD OR ARMOR GROUND RESISTANCE MEASUREMENT



Notes:

(1.) For hand cranked or battery operated Insulation Resistance Testers, the output voltage should not exceed 500 volts dc.

(2.) For dc bridge type Megohmmeters, the voltage applied to the shield or armor under test should not be less than 250 volts dc nor greater than 1000 volts dc when using instruments having adjustable test voltage levels.

(3.) When the distance between test points results in a measurement beyond the range of the test equipment, extended range devices recommended by the test equipment manufacturer may be used to assist in making the measurement.

(4.) Biddle CO.–Model BM 200, Associate Research–Model 263, General Radio–1864 Megohm Meter, or equivalent.

(c) *Test equipment.* (1) The shield or armor ground resistance measurements may be made using an insulation resistance test set, a dc bridge type megohmmeter, or a commercially available fault locator.

(2) The insulation resistance test set should have an output voltage not to exceed 500 volts dc and may be hand cranked or battery operated.

(3) The dc bridge type megohmmeter, which may be ac powered, should have

scales and multipliers which make it possible to accurately read resistance values of 50,000 ohms to 10 megohms. The voltage that is applied to the shield or armor during the test should not be less than ''250 volts dc'' nor greater than ''1,000 volts dc'' when using an instrument having adjustable test voltage levels.

(4) Commercially available fault locators may be used in lieu of the above equipment, if the devices are capable of detecting faults having resistance values of 50,000 ohms to 10 megohms. Operation of the devices and method of locating the faults should be in accordance with manufacturer's instructions.

(d) *Applicable results.* (1) For all new copper cable and wire facilities and all new fiber optic cable facilities, the shield or armor ground resistance levels normally exceed 1 megohm-mile (1.6 megohm-km) at 68 °F (20 °C). A value of 100,000 ohm-mile (161,000 ohm-km) at 68 °F (20 °C) shall be the minimum acceptable value of the shield or armor ground resistance.

(2) Shield or armor ground resistance varies inversely with length and temperature. In addition other factors which may affect readings could be soil conditions, faulty test equipment and incorrect test procedures.

(3) For the resistance test method and dc bridge type megohmmeter, the ohm-mile (ohm-km) value for the shield or armor ground resistance shall be computed by multiplying the actual scale reading in ohms on the test set by the length in miles (km) of the cable or wire under test.

(4)(i) The objective shield or armor ground resistance may be determined by dividing 100,000 by the length in miles (161,000 by the length in km) of the cable or wire under test. The resulting value is the minimum acceptable meter scale reading in ohms. Examples for paragraphs (d)(3) and (d)(4) of this section are as follows:

Equation 1. Test Set: Scale Reading * Length = Resistance-Length

75,000 ohms * 3 miles = 225,000 ohm-mile

(75,000 ohms * 4.9 km = 367,000 ohm-km)

Equation 2. 100,000 ohm-mile ÷ Length = Minimum Acceptable Meter Scale Reading

100,000 ohm-mile ÷ 3 miles = 33,333 ohms

(161,000 ohm-km ÷ 4.9 km = 32,857 ohms)

(ii) Since the 33,333 ohms (32,857 ohms) is the minimum acceptable meter scale reading and the meter scale reading was 75,000 ohms, the cable is considered to have met the 100,000 ohm-mile (161,000 ohm-km) requirement.

(5) Due to the differences between various jacketing materials used in manufacturing cable or wire and to varying soil conditions, it is impractical to provide simple factors to predict the magnitude of variation in shield or armor to ground resistance due to temperature. The variations can, however, be substantial for wide excursions in temperature from the ambient temperature of 68 °F (20 °C).

(e) *Data record.* The data shall be corrected to the length requirement of ohm-mile (ohm-km) and a temperature of 68 °F (20 °C) and shall be recorded on a form specified in the applicable construction contract.

(f) *Probable causes for nonconformance.* (1) When results of resistance measurements are below the 100,000 ohm-mile (161,000 ohm-km) requirement at 68 °F (20 °C), the jacket temperature, soil conditions, test equipment and method shall be reviewed before the cable or wire is considered a failure. If the temperature is approximately 68 °F (20 °C) and soil conditions are acceptable, and a reading of less than 100,000 ohm-mile (161,000 ohm-km) is indicated, check the calibration of the equipment; as well as, the test method. If the equipment was found to be out of calibration, recalibrate the equipment and remeasure the cable or wire. If the temperature was 86 °F (30 °C) or higher, the cable or wire shall be remeasured at a time when the temperature is approximately 68 °F (20 °C). If the test was performed in unusually wet soil, the cable or wire shall be retested after the soil has reached normal conditions. If after completion of the above steps, the resistance value of 100,000 ohm-mile (161,000 ohm-km) or greater is obtained, the cable or wire shall be considered acceptable.

(2) When the resistance value of the cable or wire is still found to be below 100,000 ohm-mile (161,000 ohm-km) requirement after completion of the steps listed in paragraph (f)(1) of this

section, the fault shall be isolated by performing shield or armor ground resistance measurements on individual cable or wire sections.

(3) Once the fault or faults have been isolated, the cable or wire jacket shall be repaired in accordance with §1755.200, RUS Standard for Splicing Copper and Fiber Optic Cables or the entire cable or wire section may be replaced at the request of the borrower.

[62 FR 23998, May 2, 1997]

§ 1755.407 Data formats.

The following suggested formats listed in this section may be used for recording the test data:

FORMAT I

OUTSIDE PLANT ACCEPTANCE TESTS – SUBSCRIBER LOOPS

PROJECT: ______ Time Measured: ______ Date of Test: ______

CO NAME OF LOCATION: ______ Tester (Contractor): ______

CO or RST GROUND RESISTANCE: ______ Ohms (Before tying to elect. neutral) Temperature: ______ Tester (Engineer): ______

CO or RST GROUND RESISTANCE: ______ Ohms (After tying to elect. neutral) Soil Type: ______ Tester (Borrower): ______

Test Equip.: ______ Moisture Content of Soil: ______

Route No.	Pair No.	Length (Miles or km)	DC Insul. Resist. (Megohms)			DC Loop Resist. (Ohms)			Measd. DC Res. Unbal. (Ohms)	Open Ckt Meas. Type (a,b,c,d)		Insertion Loss at kHz Shown						Line Noise			
			T-GD	R-GD	Min. Permit	Comp. 68°F (20°C)	Measd ___°F (___°C)	Corr. 68°F (20°C)		SRL (dB)	Freq. (kHz)	1.0	1.7	2.3	2.8	3.4	4.0	NMC	NG-C	NGF	Bal.

Shield or Shield/Armor Continuity Data has been attached. Yes ___ No ___