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Test Method for DC Loop Resistance

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1.0 SCOPE

1.1 This method is intended for use in determining the DC Loop Resistance of coaxial cables. Due to low resistances a four-wire test method is used.

2.0 EQUIPMENT

2.1 Fluke PM 6304 Programmable Automatic RCL Meter, or equivalent.

2.2 Four wire test leads as required.

3.0 PROCEDURE

3.1 Strip approximately 1 inch (2.54 cm) of the insulation exposing the inner conductor on both ends of the cable under test. Also, expose enough outer conductor or braid to make a good connection with the test leads. Cables tested on a reel must be constructed with outer jacket insulation.

3.2 Calibrate the RCL meter by connecting the leads together and performing the appropriate trim or calibration as required by the manufacturer.

3.3 Connect the measurement leads, see Figure 1, one lead to the center conductor on one end of the cable, and the other lead directly to the same conductor on the opposite end. Measure DC resistance. Record this value as R_{cc}.

3.4 Following the same procedure connect one test lead to the outer conductor of the cable, and the other directly to the same conductor on the opposite end. Measure DC resistance. Record this value as R_{oc}.

3.5 After both conductors of the cable have been measured, determine temperature of test in degrees F.

Note: Cable should stabilize in its environment for 24 hours.

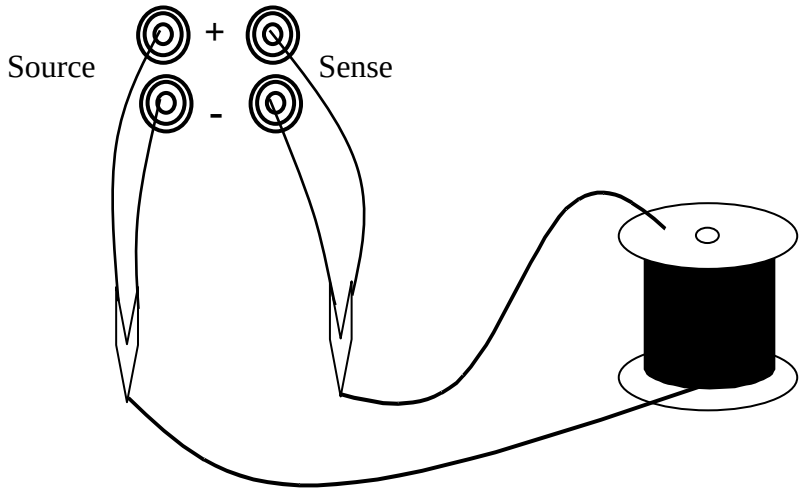

Figure 1: 4 Wire DC Resistance Measurement

Note: Ensure a good connection of the leads to the conductor(s) under test.

4.0 CALCULATIONS

4.1 The conductor resistance varies with length and temperature. The conversion from per reel or length to specified values are as follows:

$R_{Loop} = (R_{cc} + R_{oc})$

Where:

R_{cc} = Center Conductor Resistance

R_{oc} = Outer Conductor Resistance

Resistance, Ohms per 1000 feet = $(R_{Loop} * 1000)/L$ (feet)

Resistance, Ohms per 1000 meter = $(R_{Loop} * 1000)/L$ (meters)

Where:

R_{Loop} = Measured Loop Resistance (Ohms)

L = Length of Reel (Feet) or (Meters)

4.2 Resistance requirements are usually given as 68° F (20° C). Values obtained at temperatures other than 68° F can be corrected to 68° F as follows:

$$\text{Resistance at } 68^\circ \text{ F, Ohms} = \frac{R}{1+.0022(T-68)}$$

Where:

R = The resistance of the specimen at the test temperature (Ohms)

T = The temperature of the test (°F)

0.0022 = (°F) Temperature coefficient of resistivity.

Note: Temperature coefficient of resistivity is valid for both copper and aluminum.

5.0 REPORT

5.1 Date

5.2 Specimen identification (Type, Reel No., etc.)

5.3 Inner conductor resistance, outer conductor resistance, loop resistance per reel length and per specification requirement (uncorrected and corrected to 68°F)

5.4 Specimen Length

5.5 Temperature of Test

6.0 ACCURACY

6.1 The accuracy of this measurement depends on several factors. Since the DC resistance values are specified in Ohms/(1000 feet) or (km), one should measure a length ≥1000 feet for drop cable and a length ≥ 2000 feet for Trunk & Distribution type cable. Also, the accuracy of the recorded specimen length, the recorded temperature, and lead connections are important. Overall accuracy,

however, can be assumed within the published accuracy figures for the meter itself considering the resistance value being measured.