QuadTech

Application Note

Cable Reel IR Testing Application

Users and manufacturers of wiring and cabling typically measure the Insulation Resistance of the cable on reels (spools). These reels may hold literally miles of cable. Figure 1 illustrates one such cable reel immersion application. In this application, the reel is immersed in water for a given period of time to allow water to penetrate the insulation, should pin holes or other defects exist in the cable. If the insulation performs as expected, the resistance reading will be quite high. However if there is a defect in the insulation, the water will be allowed to penetrate the insulation, resulting in current leakage to the tank, deeming the cable defective. For safety concerns, the tank is grounded. When measuring grounded devices such as this, the (+) Unknown and GND should be connected to the tank and the (-) Unknown connected to the wire (cable) under test.

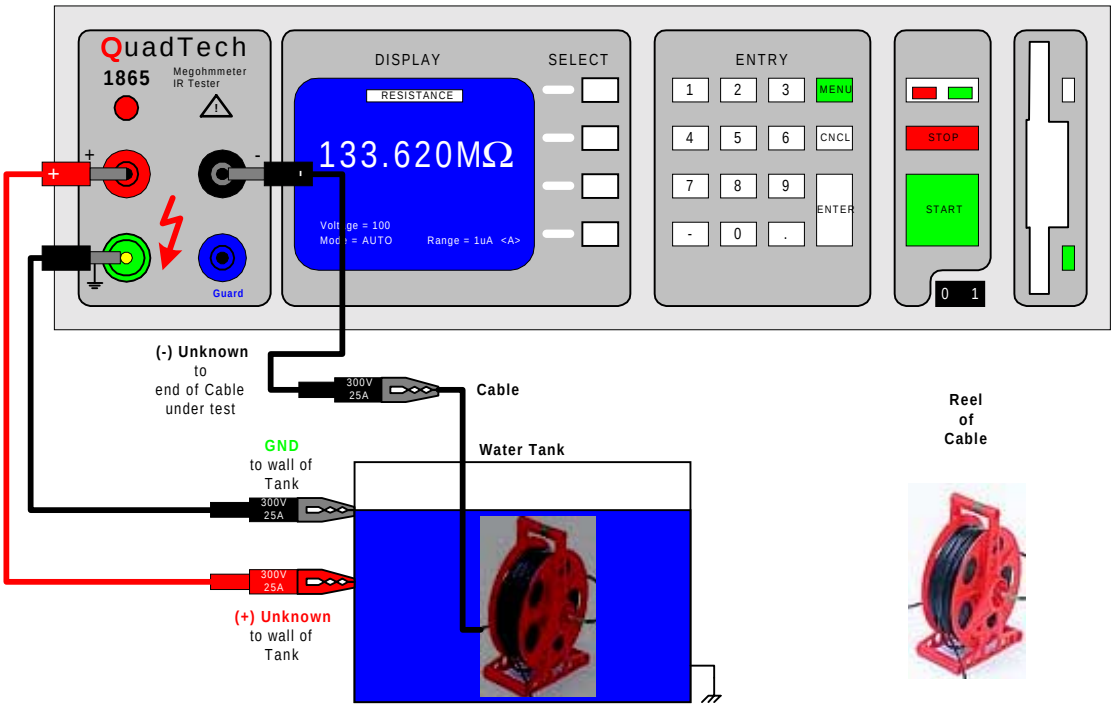

Figure 1: Immersed Cable Reel Test

Cable Reel Immersion

Cable used in certain environments needs to be tested for conditions that may occur in those environments. In particular, telephone cable (WD-1A/TT), parallel pair field wire, needs to be tested in accordance with MIL-DTL-49104A for the electrical performance parameters: DC resistance, dielectric strength, insulation resistance, attenuation and cross-talk. There are other physical characteristics that this type of cable must meet to be compliant with MIL-DTL-49104A. Table 1 lists the performance requirements of MIL-DTL-49104A.

NOTE
The main federal standard for cable and wire testing is FED-STD-228, "Cable and Wire, Insulated, Methods of Testing".

Table 1: Performance requirements of MIL-DTL-49104A

FED STD 228	Performance Test	Requirement	Requirement
Method 6021	DC Resistance	≤ 46Ω per 1000 feet	At or corrected to 20°C
Method 6111	Dielectric Strength	1000V RMS	
Method 6031	Insulation Resistance	≥ 10,000Ω per 1000feet	At or corrected to 15.6°C
	Attenuation	Refer to Figure 2 of MIL-DTL-49104A: Frequency vs. Attenuation	
	Cross Talk	At least 55dB down to adjacent similar cable	

The cable reel to be tested for the first article inspection must be two one-mile lengths of finished cable with each mile wound on a DR-5 Reel conforming to MIL-R-3241 (Reels, Cable, DR-5, DR-7, DR-8RC-453/G, RL-159/U). These two reels are put through verification tests per paragraph 4 of MIL-DTL-49104A. Of specific interest to this application note on cable reel immersion is ¶4.5.9, Insulation Resistance. The insulation resistance of the finished cable is measured after the dielectric strength test (¶4.5.8) using Method 6031 of FED-STD-228 with the following exceptions:

a. The cable is immersed for four hours
b. Test Voltage = 100V DC
a. Polarity of Conductors = Negative with respect to Water
b. One Terminal = both conductors connected together, Other Terminal = Water
c. Length of conductor under test = Twice the field wire footage
d. Temperature = 15.6°C (or corrected to)
e. Test Time = 1 minute

Refer to MIL-DTL-49104A and FED-STD-228 for specific requirements. This application note briefly discusses a customer's cable reel immersion IR test using a QuadTech IR Tester.

For complete product specifications on the 1865 Megohmmeter or any of QuadTech's products, visit us at http://www.quadtech.com/products. Do you have an application specific test? Call us at 1-800-253-1230 or email your questions to info@quadtech.com.

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