IEEE P81™/D11
Draft Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System

Sponsor

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IEEE-SA Standards Board

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Abstract: Practical test methods and techniques are presented for measuring the electrical characteristics of grounding systems. Topics addressed include safety considerations; measuring earth resistivity; measuring the power system frequency resistance or impedance of the ground system to remote earth; measuring the transient or surge impedance of the ground system to remote earth; measuring step and touch voltages; verifying the integrity of the grounding system; reviewing common methods for performing ground testing; reviewing instrumentation characteristics and limitations; and reviewing various factors that can distort test measurements.

Keywords: Ground testing, soil resistivity, ground resistance, ground impedance, ground potential rise, remote earth, electrical measurements

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This introduction is not part of IEEE P81/D8, Draft Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System .

IEEE Standard 81-1983 was prepared by the Power System Instrumentation and Measurement Committee of the IEEE Power and Energy Society. The guide was intended to cover the majority of field measurements that did not require special, high-precision equipment, and did not address unusual difficulties that can occur in large grounding systems, abnormally high stray ac or dc currents, etc. In 1991, Standard 81 was re-affirmed and IEEE Standard 81.2-1991 was released to cover the measurement of very low impedances (less than 1 ohm) along with specialized instrumentation, measurement techniques, and safety considerations.

After nearly two decades of inactivity, the Substation Committee of the IEEE Power and Energy Society determined that IEEE Standard 81-1983 and Standard 81.2-1991 contained subject matter that is very relevant for applications in electric utility facilities but the standards needed to be updated. A working group was formed to combine both standards into a singular document that included updated instrumentation, techniques and information. This document represents the efforts of that working group.

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1. Overview

1.1 Scope

The test methods and techniques used to measure the electrical characteristics of the grounding system include the following topics:

a) Establishing safe testing conditions.

b) Measuring earth resistivity.

c) Measuring the power system frequency resistance or impedance of the ground system to remote earth.

d) Measuring the transient (surge) impedance of the ground system to remote earth.

e) Measuring step and touch voltages.