Ground Resistance Testing - P2

IEEE[®] Standards on Grounding

- IEEE[®] Standard 80 Concerned with grounding of outdoor AC substations
- IEEE[®] Standard 81 Concerned with measurement of soil resistivity and grounding resistance of installed systems
- IEEE[®] Standard 142 (Green Book) Concerned with design and practical aspects of grounding

Ground resistance testing methods

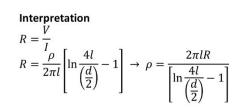
- Equally spaced 4-pin Method / Wenner Array: Wenner 4-pin method is the most commonly used ground resistance measuring technique.
 - Procedure
 - 4 electrodes of equal length 'l' are driven in a straight line at equal distance 'a'
 - Voltage between inner probes is measured
 - Current between outer probes is measured
 - Resistance and resistivity are calculated as shown below.

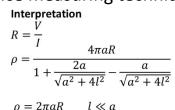
R = - $\frac{2a}{\sqrt{a^2+4l^2}} - \frac{a}{\sqrt{a^2+4l^2}}$ $\rho = 2\pi a R \qquad l \ll a$

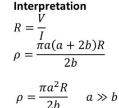
- Unequally spaced 4-pin Method / Schlumberger Array: Modified version of Wenner 4-pin method. Provides greater sensitivity for large spacing.
 - Procedure
 - 4 electrodes of equal length 'l' are driven in a straight line as shown in formula
 - Voltage between inner probes is measured
 - Current between outer probes is measured
 - Resistance and resistivity are calculated as shown in formula
- Variation of Depth Method / Driven Rod Method: This method is based on the Fall-of-Potential method

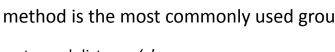
Procedure

- Test rod has diameter 'd' and it is driven into ground to a length 'l'
- Reference rods are driven to a shallow length in a straight line.
- Current is measured between Rod 1 and Rod 2
- Voltage is measured between Rod 1 and Rod 3.









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