

Analysis of earth resistance of electrodes and soil resistivity at different environments

ABSTRACT

Theoretical calculations have been done for determining the low frequency earth resistance of a set of individual electrodes, once the electrode dimensions, installation geometry and soil resistivity profile are given. Accuracy of theoretical estimations was tested by taking measurements of 25 electrodes installed at various soil conditions and environments. It has been found that in most of the site locations, especially vegetation and built-up environments, model predictions deviate considerably from measured values. Three dimensional soil resistivity map of a given land mass is essentially needed in predicting the final earth resistance of a given electrode system. Existing models are not able to produce the large variation in earth resistance, specifically due to the non-uniformity of soil resistivity and probably due to the contact resistance between electrode and surrounding soil. The outcome of this study will immensely be helpful in designing earthing systems for a given installation even at pre-construction stage.

Keyword: Ground resistance; Grounding; Environmental factors; Electrode; Soil resistivity; Contact resistance; Vegetation