Effect of Earthing Enhancing Compound (EEC) on improving tower footing resistance of a 500 kV Tower in a rocky area

ABSTRACT

This paper presents a comparative analysis of different earthing designs' performances, with particular interest on the use of earthing enhancing compound (EEC) for a selected earthing design of 500 kV transmission towers in a rocky soil, using the SESCAD tool of the Current distribution, electromagnetic field grounding and soil structure analysis (CDEGS) software. The simulation included the interpretation of soil profile and comparison between designs A, B and C, which are currently used for the 500 kV tower footing resistance (TFR) improvement. Results showed each design had reduced the TFR by 66%, 54.7% and 63.2% for the towers T42, T48 and T50, respectively. In some cases, further improvement of TFR is required, especially in the rocky area where the soil resistivity (SR) value is of more than 500 Ω·m. In this case, EEC was used in Design C, encasing both the vertical and horizontal electrodes, and it reduced the TFR further by 16% to 20%. The characteristics of the soil and earthing arrangement design play an important role in achieving a low TFR value, which is directly proportional to the backflashover occurrence and thus to the transmission line performance.

Keyword: Earthing design; Tower Footing Resistance (TFR); EEC; CDEGS