

Study of Earthing System for AC Substation: A Case Study

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Abstract: This paper presents the design of Earthing system for 400 kV substation and calculation of its parameters. Successful operation of entire power system depends to a considerable extent on efficient and satisfactory performance of substations. Hence substations in general can be considered as heart of overall power system. In any substation, a well designed earthing plays an important role. Since absence of safe and effective earthing system can result in maloperation or non-operation of control and protective devices, earthing system design deserves considerable attention for all the substations. Earthing system has to be safe as it is directly concerned with safety of persons working within the substation. Main purpose of this work is designing safe and cost effective earthing systems for 400 kV substations situated at such locations where soil of the substation site is not uniform. Initially significance of earthing is explained & methodology for design of substation earthing system is discussed for 400 kV substations. Standard equations are used in the design of earthing system to get desired parameters such as touch and step voltage criteria for safety, earth resistance, grid resistance, maximum grid current, minimum conductor size and electrode size, maximum fault current level and resistivity of soil. By selecting the proper horizontal conductor size, vertical electrode size and soil resistivity, the best choice of the project for safety can be performed. This paper mentions the calculation of the desired parameters for 400 kV substations & which are simulated by MATLAB program. Some simulated results are evaluated. A case study is done at 400 kV substations at Aurangabad in Maharashtra state of India.

Keywords: Earthing, earth grid, 400 kV substations, Power systems, Safety, Touch and Step voltages.

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