

Effect of Integrity of the Earthing System on the Rise of Earth Potential

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Abstract : This paper investigates the effects of breaks in bonds, breaks in the earthing system and breaks in earth wire on the rise of the earth potential (EPR) in a substation and at the transmission tower bases using various models of an L6 tower. Different approaches were adopted to examine the integrity of the earthing system and the terminal towers. These effects were investigated to see the associated difference in the EPR magnitudes with respect to a healthy system at various locations. Comparisons of the computed EPR magnitudes were then made between the healthy and unhealthy system to detect any difference. The studies were conducted at power frequency for a uniform soil with different soil resistivities. It was found that full breaks in the double bond of the terminal towers increase the EPR significantly at the fault location, while they reduce EPR at the terminal tower bases. A fault on the isolated section of the grid can result in EPR values up to 8 times of those on a healthy system at higher soil resistivities, provided that the extended earthing system stays connected to the grid.

Keywords : bonding, earthing, EPR, integrity, system

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