Electrical earthing in troubled environment.

Abstract

Practical challenges of electrical earthing in both steady and transient states have been revisited. By analyzing the cases based on theoretical and practical aspects, engineering guidelines are proposed to develop suitable solutions. Less complicated cases can be approached with various electrode configurations such as multiple ring, antenna, crow-foot and centipede arrangements. Distributed earthing arrangements treated with backfill materials are suitable for the sites with extremely high resistive soil. Clay based backfill materials such as bentonite-mix give corrosion and erosion protection for the electrodes in highly acidic, alkaline, saline and sulfur-rich environments apart from reducing the low frequency resistance. On-rock sites such as transmission and communication towers are better approached with concrete-based earthing systems in both cases of power and lightning protection earthing. Extreme cases of soil instability have been identified and discussed. The suitability of vertical and horizontal electrode components as well as copper and steel electrodes under various soil conditions is also discoursed. For most cases, we recommend all types of earthing systems to be integrated, however, properly coordinated system of Surge Protective Devices (SPDs) should be incorporated in such integrated earthing system.

Keyword: Grounding issues; Earthing practices; Lightning protection; Soil resistivity; Electrode