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Chemical earthing procedure diagram pdf

Clause 7.0.1 of IS-3043:1987 states as under :The basic objectives of equipment grounding are : To ensure freedom from dangerous electric shock voltages exposure to persons in the area. To provide current carrying capability, both in magnitude and duration adequate to accept the ground fault current permitted by the over current protective system without creating a fire or explosive hazard to building or contents. To contribute to the better performance of electrical system It depend on the condition of soil The resistivity of soil. Design of the earthing system Level of humidity to be maintained in the ground The installation of the electrode either conventional PIT TYPE or the CHEMICAL ELECTRODE deep into the ground below the FROST level or 2meters to 5meters deep so that moisture level is obtained in the soil for efficient working /performance of the either of the earthing systems is in vogue now a day. Clause 8.6 of IS 3043 -1987 ; Moisture content is one of the controlling factors in the earth resistivity .The moisture content is expressed in percent by weight of the dry soil .Dry earth ways about 1440 kg per cubic meters and thus 10 percent moisture content is equivalent to 144 kg of water per cubic meter of dry soil . A difference of few percent moisture will therefore make very marked difference in the effective of earth connection if the moisture content falls below 20 percent .The normal moisture content of soils ranges from 10 percent in dry seasons to 35 percent in wet seasons, and an approximate average of may be perhaps 16 to 18 percent . It should be recognized, however, that moisture alone is not the predominant factor in low resistivity of soil, for example , the earth rods driven directly in the beds of rivers or mountains streams may present very high resistance to earth. If the water is relatively pure , it will offer high resistivity and unless the soil contains sufficient natural elements to form a conductive electrolyte , the abundance of water will not provide the soil with adequate conductivity. The value of high moisture content in the soil is advantageous in increasing the solubility of existing natural elements in the soil , and in providing for the solubility of ingredients which may be artificially introduced to improve the soil conductivity Clause 8.7 IS 3043 -Effect of Temperature on Earth resistance Temperature coefficient of resistivity for soil is negative, but negligible for temperatures above freezing point. At about 20 °C the resistivity change is about 9 percent per degree Celsius. Below 0°C the water in the soil begins to freeze and introduces a tremendous increase in the temperature co-efficient, so that as the temperature becomes lower the resistivity rises enormously .It is therefore recommended that in areas where the temperature is expected to be quite low , the earth electrodes should be installed well below the frost line .Where winter seasons are severe, this may about two meters below the surface , where as in mild climates the frost may penetrate only a few centimeters or perhaps the ground may not freeze at all .Earth electrodes which are not driven below the first depth may have a great variation in resistance throughout the seasons of the year .Even when driven below the frost line , there is some variation , because the upper soil , when frozen , presents a decided increase in the soil resistivity and has the effect of shortening the active length of electrode in contact with soil of normal resistivity. Following Four Methods are Practical and used Suggestions for installing earth electrodes in Hilly /Rocky /High resistivity soils Method One . Artificial treatment of soil Clause 8.8 Of IS 3043 Multiple rods ,even in large numbers, may some times fail to produce an adequately low resistance to earth. This condition arises in installations involving soils of high resistivity .The alternative is to reduce the resistivity of soil immediately surrounding the earth electrode .To reduce the soil resistivity ,it is necessary to dissolve in the moisture ,normally contained in the soil , some substance which is highly conducive in its water solution .The most commonly used substances are sodium chloride(NaCl),also known as common salt,calcium chloride(CaCl2),Sodium carbonate (Na2CO3), Copper sulphate (CuSO4) . Salt and soft coke , and salt and harcoal in suitable proportions. Clause 8.8.1 With average or high moisture content, these agent form a conducting electrolyte throughout a wide range of earth electrode. Approximately 90 percent of the resistance between a driven rod and earth lies within radius of two meters from the rod. This should be kept in mind when applying the agents for artificial treatment of soil. The simplest application is by excavating a swallow basin around the top of rod , one meter in diameter and about 30 cm deep, and applying the artificial agent in the basin The basin should be subsequently be filled with water several times , which should be allowed each time to soak in the ground ,thus carrying the artificial treatment ,in electrolyte form ,to considerable depths and allowing the artificial agents to become diffused throughout the greater part of effective cylinder of earth surrounding the driven rod. Clause 8.8.3 In most of the soil conditions, the artificial treatment may be effective over a period of many years However it is recommended that annual or biannual measurement of earth resistivity should made to find out if additional treatment is needed Clause 8.8.4 In using this artificial treatment, the possible corrosive effect of the salt on the driven rods and connections should be considered. The possible contamination of domestic water supply should also be considered Method Two (Installing electrode at angle of 30° to Horizontal) Clause 9.2.2 Last para In cases where impenetrable (which cannot be dug deep) strata or high resistivity soil occur at relatively small depths , considerable advantage may result from driving rods at an angle of about 30° to the horizontal , thus increasing the length installed for a given depth. Method Three (L Shaped Electrode) This method is used by manufacturers of electrodes in the hilly or rocky areas where digging is not practical even by use of pneumatic hammers or Rock Drills. In such situations L shaped electrodes are designed .To quote an example a 3000mm electrode will be designed with small arm of the L as 600mm and long arm 2400mm .it is seen that in rocky /hilly areas one can manage to dig manually up to 600mm (2 feet). Method Four (Combination of L Shaped electrode and replacing the soil with AGRICULTURE SOIL.This method is combination of replacing the soil with agriculture soil and providing the L shaped electrodes. This method is very extensively used by the manufacturers of electrodes and has been found to give very good earth resistance values, and does not need periodic maintenance of soil. This method has proved more durable and reliable Summary & Conclusion The Is 3043 -1987, NEC 2011 and Indian Electricity Rules (Latest) provide the requirement of earthing considering minimum and essential safety parameters for various applications in domestic ,commercial , industrial , generation , transmission and distribution levels of electricity . In our sincere opinion based on our years of experience in the electrical safety business, the judgment of the Project Engineer should be adjudged as FINAL since he is fully aware of the site conditions and other parameters. Safety is Very Essential, let us RESPECT the judgment of PROJECT PERSONNEL The volume of the Dug Up area in case of L shape earthing and earthing inclined at 30 ° will be more than that of regular Cylindrical earthing , the use of BACK FILL COMPOUND will be minimum two bags more than that what is recommended by us Our Final Recommendation The L shaped earthing installed with Replacement of soil with AGRICULTURE SOIL in such difficult areas is the final , positive , no failure method. Gomti Nagar, Lucknow D-370, 2nd Floor, Vibhuti Khand, Gomti Nagar, Lucknow - 226010, Dist. Lucknow, Uttar Pradesh Industry Leader TrustSEAL Verified Company Video Contact Supplier Request a quote Sector 31, Faridabad No. 14/3, Bolton Compound, Mathura Road, Sector 31, Faridabad - 121003, Dist. 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