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Accurate earth resistance measurement of communication towers

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The number of telecommunication towers has drastically increased in the recent years due to the rapid expansion of mobile communication. A growing concern has arisen among the public as to the lightning hazards of antenna structures in their neighborhood. By February, 2013 five mobile operators and three fixed line operators were using 5083 communication towers island wide. Lightning is a complicated way of transferring electric charges between clouds and earth. For this, resistance of the earth connection (between the tower and the Earth) should be a minimum. According to the communication tower standard policy in Sri Lanka the earth resistance should be maintained below 10 Ω.

Most engineers use conventional digital earth testers for the measurement of earth resistance (accuracy ± 5%) with 20 m long current and voltage probes. To get an accurate reading of a large grounding network, a distance greater than 20 m between the ground conductor under test and the remote current electrode is required. In the present study conventional 20 m probes were replaced by new 50 m probes. However, in some countries more expensive new earth testers have been introduced with 100 m long probes. The purpose of this study was to find a technique to increase the performance of the conventional 20 m probe testers by using probes of longer length. Measurements taken by the modified conventional tester with 50 m probes were compared with the long probe Yokagawa 323511 (accuracy ± 5%) tester with 100 m probes. The results indicate that the conventional tester readings are 9.6 % less than the Yokagawa tester readings. It shows that low cost digital earth testers can be used with the extended probes instead of the expensive long length earth testers for better results.

Keywords: Communication tower standards, earth resistance, earth tester, lightning protection, telecommunication towers

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