Performance of graphite and activated carbon as electrical grounding enhancement material

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Abstract:
The main purpose of electrical grounding system is to disperse unwanted electrical fault to the ground within shortest time. Graphite and activated carbon (AC) are used as an alternative materials to improve the performance of earth grounding system. This study aims to investigate of the physical and mechanical behavior of conductive aggregate derived from graphite and AC namely, the electrical resistivity, water absorption and crushing strength. In addition, similar tests were also conducted on mortar aggregate for comparison. The electrical resistivity of aggregates were measured by using soil box method. Test results showed that the electrical resistivity, water absorption and crushing strength of all aggregates varied with time. These values were found to be stabilized after approximately after 14 days. The electrical resistivity for aggregates containing graphite and AC were found to be 49.2 Ω.m and 185 Ω.m far lower than 12700 Ω.m obtained for mortar-based aggregates. Similarly, the water absorption for graphite and AC aggregates were greater compared to mortar aggregates. On the other hand, the crushing strength for graphite and AC aggregates was to be lower. Incorporating graphite and AC significantly improved the electrical resistivity behavior while maintaining acceptable mechanical properties crucial for electrical grounding purposes. Overall, graphite shows the good performance in electrical resistivity compared to AC.

Keywords: Grounding System; Conductive Aggregate; Graphite; Activated Carbon; Ground Enhancement Material

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