

Permanent Low Impedance Solution for rocky grounds

Fully complies to IEC 62561-7 Standard, IEEE 80 Std, BS EN 62305:06 & MS IEC 62305:06

Introduction

Tokai's all new Marconite is an electrically conductive carbon aggregates that can be mixed with ordinary cement and water to form a conductive concrete. Marconite can be used in all types of earthing applications; e.g. to lower the earthing resistance, to be used as a backfill in bore holes, to provide a theft-proof solution or just to simply enhance the overall earthing system performance.



Description	Product No.
TOKAI Marconite (25kg) - Pure	TK 500
TOKAI Marconite (10kg) - Pre-Mixed	TK 510-PM
TOKAI Marconite (20kg) - Pre-Mixed	TK 520-PM
TOKAI Marconite (25kg) - Pre-Mixed	TK-525-PM

Product Description

Tokai's Marconite is a dark grey, granular material that replaces traditional sand and aggregate materials used within concretes mixes. Marconite is designed, developed and manufactured specifically for use in electrical earthing.

- Low resistivity: 0.001 ohm.m
- Versatile: suitable for most ground conditions and becomes a permanent, solid structure that it is not prone to shrinking, drying out or being washed away
- Cost effective: it is a permanent solution; there is no need to remove and replace or 'maintain' it with additional water / salts every few years in order to achieve the desired earth values
- Chemically inert: is non-corrosive to steel or copper, does not attack cement structures and has a pH within the neutral range
- High strength: can be used as part of the building structure itself and can achieve strengths higher than Grade 25 concrete
- Easy to use: forms a concrete like material that from first pour, achieves a low resistance earth, no need to wait or return to test
- Suitable for all types of soil

Quality Lightning Component

Applications

Marconite is mixed with ordinary cement and normally in a ratio of 2:1 and then with liberal amount of water to give a readily pourable consistency. When used with a copper rod in a typical bore hole, the mix will adhere to the rod and set into permanent hardened form. The earthing effects relate both to the conductivity of the medium involved and surface area, the Marconite mix is able to pass on both benefits in use.

The compound provides a permanent and more economical solution to earthing problems and has the advantage of giving a large area of dissipation for current at high frequencies providing a very low impedance path for high voltage grounding requirement. When copper tapes are encapsulated within Marconite, the earthing system will have a higher surge current discharging capacity as the contact with the surrounding soils are greatly increased. As the compound hardens, any attempt to steal the copper tapes will be extremely troublesome as the cured Marconite has the strength of ordinary concrete. In terms of earth fault current dissipation, Marconite cast in cube form works exactly on the same principle as the buried horizontal copper grid system and is designed to ensure a low impedance value.

When severe earth fault occurs in a sub-station, the Marconite cube has the effect of equalizing the surface potential over the total area of the cube, and then transferring the steep potential gradients to the periphery of the cube, where they are reduced. The transfer of steep potential gradients is also helped by the excellent surface bond between the surface of the Marconite and the earth. When a copper grid is encapsulated inside a Marconite cube, any discharge current will be dissipated through the whole of the grid system, then into Marconite and then eventually through to the surrounding soil or rock.

Marconite RESISTIVITY

The resistivity of Marconite is of the order of $0.001\Omega.m$ and even when mixed with cement, its resistivity is still only $0.1\Omega.m$, significantly lower than either normal concrete (sand and cement) or Bentonite.

The comparison is as follows:

Resistivity of Marconite	= $0.001\Omega.m$
Marconite conducting concrete	= $0.1\Omega.m$
Resistivity of Concrete	= 30 to $90\Omega.m$

Marconite for Borehole System

Sometimes in order to get an acceptable earthing resistance, bored holes are needed for the construction of an earthing system. Instead of backfilling with normal soil, for greater effectiveness, the bored hole can be back filled with Marconite. For such application, we would recommend a fine grade Marconite so that the mixture could be readily poured into the bored hole. Marconite when mixed with lot of water, in its slurry form will penetrate into the surrounding soil and seep into cracks to greatly increase the contact area with the surrounding soil. This will have the benefit of lower the resistance as well as the earthing impedance. Marconite is effective as soon as it is poured into the bored hole. The earth resistance could be measured immediately after the Marconite is poured. The resistance reading before and after the Marconite is cured should remain approximately the same. It is best not to disturb the Marconite and leave it to cure for at least 48 hours before backfilling with normal soil on top.



Marconite for Difficult Earthing Problems

For a very difficult earthing project, for which the soil resistivity may exceed 1000 ohms.m, it is sometimes necessary to construct the main earth using Marconite cube with copper grid encapsulated within the cube. The nominal cube size recommended is $1m \times 1m \times 1m$ for effectiveness. The number of cubes required will depend on the soil resistivity. The final resistance is achieved by interlinking all the Marconite cubes buried at a depth of at least 1m (or 1 to 1.5m) below the ground surface.



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