GCEM

GROUND CONDUCTIVITY ENHANCING MATERIAL

THE ULTIMATE SOLUTION FOR ELECTRICAL EARTHING

ZEEMAX VENTURE Sdn Bhd

ZEEMAX VENTURE SDN BHD
Alam Sanctuary, 18, Jalan Alam Putra 3A,
Seri Kembangan, 43300, Selangor, Malaysia.
Tel: +6010.2777.896 AND +6013.3418.498
Email: info@zeemaxventure.com
Website: www.zeemaxventure.com

GCEM

GROUND CONDUCTIVITY ENHANCING MATERIAL (GCEM)

GCEM is developed after several years of Research & Development and has been quite extensively used very successfully on several locations all over the world. It is an ultra conductive material that improves grounding (earthing) effectiveness. It contains a “Soil Resistivity Reducing Agent” which substantially lowers the resistance of the grounding system.

WHY GCEM ?

- ✓ Construction Sites
- ✓ Power Generation Stations
- ✓ Switch-yards and Substations
- ✓ Transmission Poles & PMTs
- ✓ Factories and Manufacturing Plants
- ✓ Communication & Broadcasting Towers
- ✓ BTS (Base Transmission Stations)

In most parts of the world, all of the above and many other low voltage installations, are erected on extremely high resistive grounds or locations where soil resistivity is generally remains on higher side OR Where un-predictive and varying values of soil resistivity causes variation in grounding resistance values. In such cases, achieving a Sound Grounding System with Low Earth Resistance is most often a daunting task… GCEM provides an effective solution to the above problem and also offers a good corrosion resistance, ensuring “Effective-Conductivity” & “Integrity” of the Earthing-System.

HOW IT WORKS ?

GCEM is an “Ultra-Conductive” buffer material with a soil resistivity reducing agent which substantially lowers the resistance of the grounding system. The chemically semi-inert properties of GCEM provide a good corrosion resistance by making protective layers around the buried grounding system and protecting it from corrosion.

This material was developed after many years of R & D and has been used quite extensively & successfully throughout the world. It can be used in conjunction with the conventional copper grounding material (rod/copper conductors) or any other type of metal electrodes in;

- ✓ Rocky & Sandy Soil
- ✓ Soil with extremely high resistivity
- ✓ Areas where ground conductivity fluctuates significantly
- ✓ Sulfur and salt rich environments

GCEM IS A GREEN PRODUCT

GCEM is manufactured from environment-safe and stable components and does not contain any heavy metals or toxic materials.

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FEATURES

Reduce Soil Resistivity

Provides a low soil resistivity around the Grounding Electrode (Rod)

Achieve Low Earth Resistance

Greatly helps in reducing grounding resistance, lower than Rod and Grounding Conductor alone.

Corrosion Protection

The material erosion of ground electrodes due to corrosion-catalysts in the soil is prevented.... A very important aspect associated with Good Grounding System in providing Permanent Low Resistance.

Solution for Space-Restricted Installations

GCEM provides a remarkable answer where ground rods cannot be deep-driven or limited land area is available.

One-time solution

GCEM provides a Permanent Low Resistance that does not fluctuate with Seasonal Variation.

No after-installation hassles

GCEM does NOT require the Recharging of salts or water to maintain the low grounding resistance of the grounding system as it maintains its good conductivity properties permanently.

Easy to install

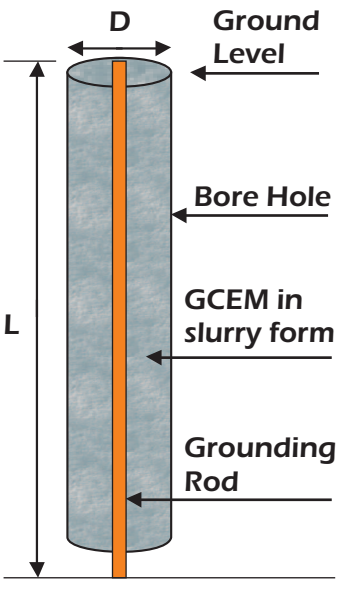
Application of GCEM is very convenient and can be installed using Trench or Ground Rod Backfill methods.

Proven over the years

GCEM is the outcome of research done over many years in FOUR countries, with different Climatic Conditions, Varying Temperatures and with Ultra-Resistive Soil types.

INSTALLATION PROCEDURE OF GROUNDING ELECTRODES WITH GCEM

Installation of Vertical Grounding Electrode



1. Auger a borehole of diameter (D) 10 cm – 24 cm, as the design suggests. The depth of the bore should be equal to the length of the rod minus 10 cm.
   Note that if you intend to make an earth inspection pit the borehole length should be considered from the bottom of the pit. A suitable length of protrusion of the rod should be left at the top for the connection of grounding wires, tapes etc.
2. Center the rod in the borehole and drive for about 10 cm to support the rod.
3. Make a slurry of GCEM by adding about 15-20 liters of water per GCEM bag of 25 kg (depending upon the level of dryness of the site).
   Note that the quantity to be used can be calculated either by the equation given below or by the TABLE – A provided below
4. Fill the borehole (around the rod) with GCEM Slurry from the top of the borehole.
5. As you fill the hole with Slurry of GCEM, use any type of wooden or metallic rod of 1-2 cm in diameter and slowly stir-up the Slurry in the borehole.
   This allows any air pockets to be released. Sometimes when the soil is too dry and the depth of hole is large , additional pouring of water helps in getting slurry to the bottom, but care should be taken not to use too much of water as to fill the whole hole with water itself.

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NUMBER OF GCEM BAGS REQUIRED FOR A GIVEN BOREHOLE

The number of Bags of GCEM (25 kg each) required to fill a given bore hole can be calculated by the following equation:

No of Bags of GCEM = 27 x D^2 x L

Where both D and L are in meters (m).
Note that L is the total length of the vertical rod. (Not the depth of the bore hole)

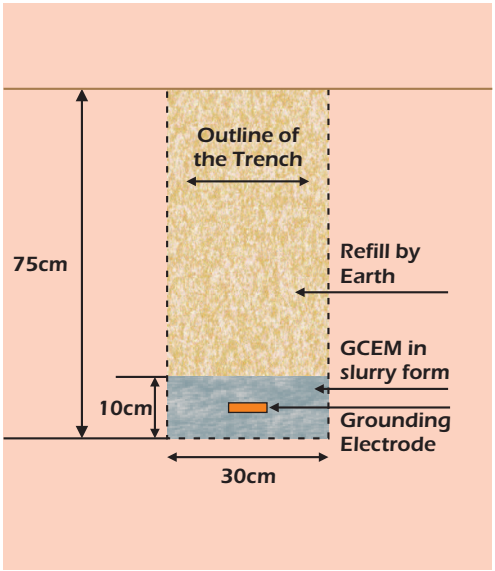
TABLE-A

Number of GCEM bags required for a given borehole

Diameter of the bore hole (D)	Length of the vertical rod (m)					
	1.5	3.0	4.5	6.0	7.5	9.0
0.10m (10 cm)	0.4	0.8	1.2	1.6	2.0	2.4
0.12m (12 cm)	0.6	1.2	1.7	2.3	2.9	3.5
0.14m (14 cm)	0.8	1.6	2.4	3.2	4.0	4.8
0.16m (16 cm)	1.0	2.1	3.1	4.1	5.2	6.2
0.18m (18 cm)	1.3	2.6	3.9	5.2	6.6	7.9
0.20m (20 cm)	1.6	3.2	4.9	6.5	8.1	9.7
0.22m (22 cm)	2.0	3.9	5.9	7.8	9.8	11.8
0.24m (24 cm)	2.3	4.7	7.0	9.3	11.7	14.0

INSTALLATION PROCEDURE OF GROUNDING ELECTRODES WITH GCEM

Installation of Horizontal Grounding Wire or Rod



The effectiveness of an electrode depends not only on its size but on its geometry: its shape and its orientation with respect to the Earth's surface. A Ground-bed, of GCEM built around a ground conductive bare cu-wire or Flat-strip can be used where a ground ring is required or where bedrock near the surface prevents the use of vertical rods. A very low resistance can be achieved in high-resistivity soil by a long strip or bare cu-wire surrounded by GCEM.

The resistance of an electrode is inversely proportional to its capacitance, and the impedance to lightning surges is inversely proportional to the square root of the capacitance. The GCEM Ground-bed resembles a capacitor plate, has a high capacitance, and thus has a very low resistance and impedance in case of Rocky Soils or where the Soil Resistivity is very high.

We recommend the installation of horizontal electrodes (copper tapes of cross section 25 mm x 3 mm is strongly recommended) in a trench of at least 0.75 m deep and 30 cm wide. Lay the copper tape in the trench and pour the slurry of GCEM to a thickness about 10 cm. Roughly 1 bag of GCEM will cover 1 m length of copper tape. The diagram on the left shows the cross section of the installation after the trench is filled back with left over ground soil.

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ALT
ADVANCE LIGHTNING TECHNOLOGY

Advance Lightning Technology (M) Sdn Bhd
119-1 Jalan SBC1, Taman Sri Batu Caves,
68100 Batu Caves, Selangor, Malaysia.
Tel: +603 61888467, Fax: +603 61880467
H/P: +6 019 386 6997
Email: sales@advancegrp.com
Website: www.advancegrp.com

Exclusive Distributor for MENA Region

STEELMAN
ELECTRO MECHANICAL COMPANY LLC

P.O. Box 47461, Dubai-UAE
Tel: + 971 4 2575591
Fax: + 971 4 2575592
Mobile: +971 55 7934302
Email: m.umair@steelmanem.com
Website: www.steelmanem.com