

Ultimate Solution for Electrical Earthing Premium Quality Backfill Material for Earthing

■ GCEM - GROUND CONDUCTIVITY ENHANCING MATERIAL

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
- 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

■ SALIENT FEATURES

✓ GCEM IS A CERTIFIED ECO-FRIENDLY & GREEN PRODUCT

GCEM is manufactured from environmentally safe and stable components and doesn't contain any heavy metal or toxic material. It is a certified eco-friendly product and doesn't harm the soil or surrounding vegetation & plantation or underground water reservoirs.

✓ REDUCES SOIL RESISTIVITY

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

✓ HELPS GETTING LOW EARTHING RESISTANCE

Helps in reducing grounding resistance, lower than Rod & Grounding Conductor alone.

✓ PROVIDES CORROSION PROTECTION TO UNDERGROUND EARTHING SYSTEM

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

✓ CONFORMS TO IEC 62561-7 STANDARD

GCEM conforms to IEC 62561-7 (International Electrotechnical Commission), a Benchmark for Low Resistivity & Corrosion Protection Performance of Ground Conductivity Enhancing Materials.

✓ 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.

✓ EASY TO INSTALL

Application of GCEM is very convenient & can be installed using Trench or Ground Rod Backfill methods discussed in detail on page 3 & 4

✓ PROVEN OVER THE YEARS

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

■ INSTALLATION PROCEDURE OF GROUNDING ELECTRODES WITH GCEM

① INSTALLATION OF VERTICAL GROUNDING ELECTRODE (EARTH ROD)

- ✓ Auger a borehole of diameter D, 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.
- ✓ Center the rod in the borehole & drive for about 10 cm to support the rod.
- ✓ Make a slurry of GCEM by adding about 25-40 liters of water per GCEM bag of 25 kg (depending upon the level of dryness of the site).
Note that the quantity of GCEM to be used can be calculated by the equation given below.
- ✓ Fill the borehole (around the rod) with GCEM Slurry from the top of the borehole.
- ✓ 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 borehole with water itself.

GCEM (BACKFILL) QUANTITY CALCULATION

The number of GCEM bags (25 Kg each) required to fill a giving Bore Hole can be calculated by the following eqation

$$\text{Number of GCEM bags} = 27 \times D^2 \times L$$

L = Depth of Earthing Bore Hole (in Meters)

D = Diameter of Earthing Bore Hole (in Meters)

Example : For a 10 Feet Deep & 6 Inch Dia Earthing Bore Hole

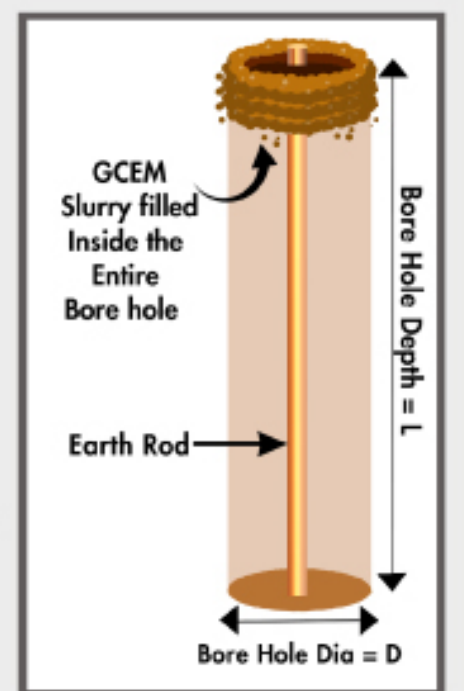
L = 10 ft / 3.28 = 3.05 m & D = 6 in x 0.0254 = 0.1524 m

No. of GCEM bags = $27 \times (0.1524)^2 \times 3.05 = 1.912 \approx 2$ Bags

We recommend 6" dia bore hole as this gives enough low resistivity material (GCEM) to surround the earth rod & gives good result

THUMB-RULE : 5' Deep & 6" Dia Bore needs 1 Bag of GCEM

Similarly 10' Deep & 6" Dia Bore needs 2 Bags of GCEM



INSTALLATION PROCEDURE OF GROUNDING ELECTRODES WITH GCEM

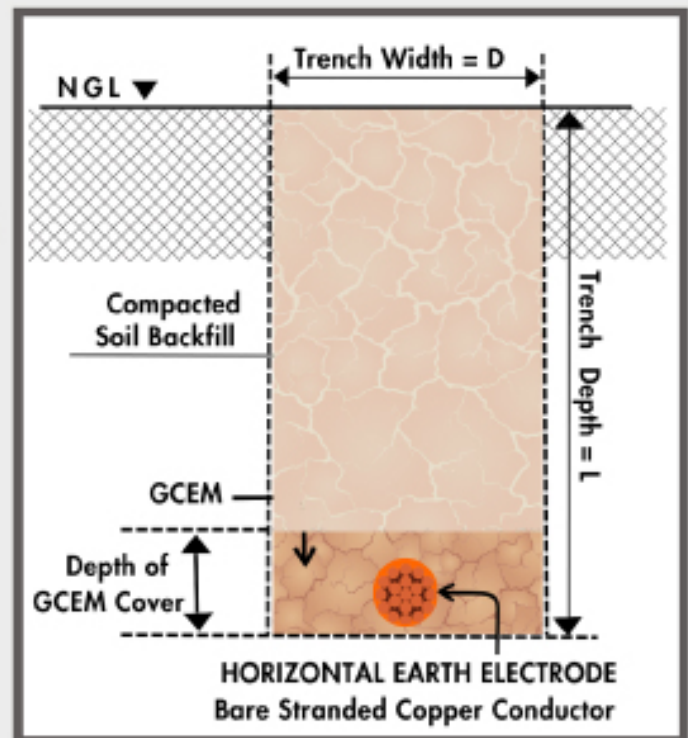
2 INSTALLATION OF HORIZONTAL GROUNDING ELECTRODE (STRIP OR BARE CONDUCTOR)

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-conductor or Flatstrip 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-conductor layed horizontally in a trench and surrounded by GCEM.

We recommend installation of Horizontal Electrodes (Copper Tapes of Cross Section 25mmx3mm OR Bare Stranded Copper Conductor of Cross Section 35mmsq to 120mmsq as recomended by Earthing System Designer) in a trench of at least 0.75m to 1m deep and 45cm to 60cm wide.

FOR THE INSTALLATION OF HORIZONTAL EARTH ELECTRODE INTO THE TRENCH, FOLLOWING PROCEDURE IS RECOMMENDED.

- ✓ Dig a Trench of 0.75 to 1m deep & 45 to 60 cm wide as recommended by the Earthing System Designer (D & L of the diagram as per design) ➡
- ✓ Lay the Horizontal Electrode (Earth Strip or Bare Conductor Cable) all along the length of the trench.
- ✓ Pour dry GCEM Powder into the trench on top of Horizontal Earthing Electrode. 1.5 to 2 Bags of GCEM per meter are required depending upon the trench width & GCEM cover depth
- ✓ Depth of GCEM cover (as shown in diagram) ➡ should be as per designer's recommendations, but not less than 10 cm thick. Ensure that the Strip / Bare conductor is fully covered by dry GCEM powder.
- ✓ Fill the trench with water and make sure that the water filled covers 50-60% of the trench depth. Let the water absorb by GCEM dry powder fully by keeping water standing in the trench for at least 8-10 hours & preferably 24 hours if possible.
- ✓ Carefully Backfill & Compact the remainder of the trench with the site's native soil



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