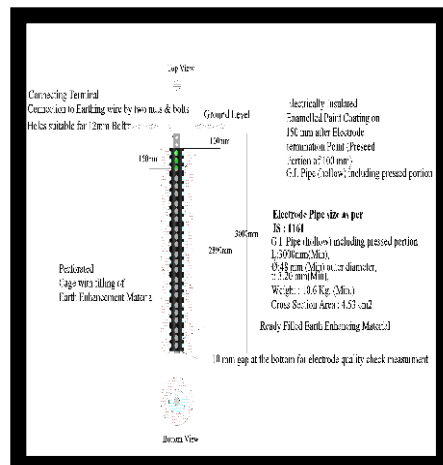


**Gujarat Power Research & Development Cell**  
(A Govt. of Gujarat Initiative)  
**Gujarat Urja Vikas Nigam Ltd**  
CIN: U40109GJ2004SGC045195,  
IIT Gandhinagar Research Park, IIT Gandhinagar,  
Palaj-382355, Gandhinagar, Gujarat, India  
[www.guvnl.com](http://www.guvnl.com); [www.gprd.in](http://www.gprd.in); [guvnlrnd@gmail.com](mailto:guvnlrnd@gmail.com)



## Maintenance Free, Eco-Friendly, Ready Capsule, Pipe-In-Cage (PiC), Type Earthing and Ideal transformer center earthing For Power Distribution Network

Title of the Research: Maintenance free eco-friendly earthing for HT/LT Power Distribution Network





**Present System:** Presently, the earthing practice followed by all DISCOMs is generally to install the salt charcoal type earthing system. The earth pit is erected with the augur or manually. The earth pit is filled with layer of salt and charcoal. As the earth electrode coil made of GI wire is used or GI plate is used. In some urban installations, maintenance free earthings are used but that is also having very limited application due to quite high cost.

#### **Limitations of the present system:**

- Conventional Salt-Charcoal type earthing requires frequent recharging of water, which, in a distribution network, is very difficult to do.
- Increasing trend of its resistance over the period of time.
- Due to presence of salt, the electrode becomes corrosive, which leads to a higher earth pit resistance over the period of time. Hence, the effective lifetime of the earthing is very less.
- On-field malpractice such as inappropriate digging of earth pit and filling of Salt-charcoal layer, improper watering at site, is likely to take place, if supervision is not proper.
- Installation procedure is effective for time being, convenient, less time consuming and cheaper.
- Transportation and storing of material is comparatively difficult due to diverse inventory.

### **Detail report of Innovation/solution:**

An earthing system comprises a galvanized hollow pipe i.e. an earth electrode is longitudinally disposed within a galvanized perforated cage by defining a space. Said space between the earth electrode and the perforated cage is to be filled with a developed earth enhancement material (EEM) to improve the conductivity of the electrode and the ground contact area.

The developed earth enhancement material being filled between the earth electrode and the perforated cage is mainly composed of conductive cement; graphite carbon powder; sodium montmorillonite/ sodium bentonite powder; hydrous aluminum silicate etc. to reduce earth resistivity. Further, said developed earth enhancement material (EEM) is a superior conductive material that improves earthing effectiveness especially in areas of poor conductivity such as rocky ground, sandy soil and areas of moisture variation with different soil strata.

Said earth electrode is a means for collecting, releasing and discharging earth leakage and fault currents. The packing of the earth electrode within the perforated cage is carried out in such a manner that no any material leakages happen even in worst transportation and handling condition. Further, the said earth electrode is cylindrical in shape for uniform distribution of fault currents.

**How does new innovation help to overcome Limitations of the present system:** The earthing system of the present invention is having a longer life and almost maintenance free which requires no periodic or scheduled maintenance at least for a period of 15 years. Further, there is no requirement to add any other chemical or water at any time after the initial installation because of hygroscopic characteristic of earth enhancement material (EEM). Due to pre-fabricated, ready to use methodology, there is no on-field wastage of the earth enhancement material. The said earthing system is effective, convenient, less time consuming and cheaper in terms of installation, transportation and storage; and the quality assurance of this type of earthing system is carried out very effectively with minimum effort. Moreover, said earthing system imparts continuous and satisfactory operations in the actual service conditions at site.