

CHEMICAL EARTHING

ALFRED KIM

www.alfredkim.net

Your Questions Answered!

Delivering your vision,
Empowering your
electrical safety

Alfredkim Systems & Solutions Pvt. Ltd.
14/3, Bolton Compound, Mathura Road,
Faridabad-121003(Haryana) India
Tel: +91-129-4158603

<http://www.alfredkim.net>



Your Questions – Our Answers

- ❑ Why Electrical Earthing?
 - ❑ Why G.I. is Better than Copper?
 - ❑ How Earthing System Works?
 - ❑ What is System of grid earthing?
 - ❑ Why earthing near to equipment?
 - ❑ Why Discard Pit Type Earthing?
 - ❑ Why Switch to Chemical Electrode Earthing?
 - ❑ Why control floating neutral voltage?
 - ❑ What are Stray Voltages?
 - ❑ Why Water new earth bore?
 - ❑ How is price comparable Cu vs. Chemical earthing?
 - ❑ How to select & Install Alfredkim Earthing Systems?
 - ❑ Why Chemical Earthing is more Durable and reliable?
 - ❑ How To Audit Existing Earthing System and Provide Solutions
- ❑ Specification For Alfredkim Electrodes
 - ❑ Want a Electrician in India
 - ❑ Do's and Don'ts – General Precautions



SPECIFICATION FOR ALFREDKIM CHEMICAL EARTHING

□ A. MODEL- AKE0248 (48mm x 2000mm)

10) GBFC(Ground Back Fill Compound) :-

- I) Minimum 35kg It is soil enrichment chemical mainly consisting of **Aluminum Silicate**.
- II) It absorbs moisture but doesn't get dissolved in water.
- III) It can absorb water 13 times of its weight.
- IV) The top & bottom of the pipe is sealed permanently.

11) Earth fault capacity:-

150KVA

12) Surface Area:-

301440mm

13) Brand:-

Alfredkim

14) Manufactures:-

ALFREDKIM SYSTEMS & SOLUTIONS PRIVATE LIMITED

14/3, Bolton Compound, Mathura Road, Faridabad-121003, Haryana

(India)

www.alfredkim.net

SPECIFICATION FOR ALFREDKIM CHEMICAL EARTHING

□ A. MODEL- AKEo248 (48mm x 2000mm)

1) Type of Earthing:-

Sealed maintenance free chemical filled earthing electrode.

2) Diameter of the pipe:-

48mm

3) Thickness of the pipe:-

3.5mm

4) Length of the pipe:-

2000mm

5) Galvanized Thickness:-

80-100micron

6) Type of galvanizing:-

Hot dipped

7) Size of the conductor:-

30x6 G.I. strip

8) Terminal diameter:-

12mm

9. Chemical used inside the pipe:-

CCM(Crystalline conductive material) Approx weight 4

KG

SPECIFICATION FOR ALFREDKIM CHEMICAL EARTHING

B. MODEL- AKE0348 (48mm x 3000mm)

1) Type of Earthing:-

Sealed maintenance free chemical filled earthing electrode.

2) Diameter of the pipe:-

48mm

3) Thickness of the pipe:-

3.9mm

4) Length of the pipe:-

3000mm

5) Galvanized Thickness:-

80-100micron

6) Type of galvanizing:-

Hot dipped

7) Size of the conductor:-

30x6 G.I. strip

8) Terminal diameter:-

12mm

9) Chemical used in the pipe:-

CCM(Crystalline conductive material)Approximate Weight-5.5kg



SPECIFICATION FOR ALFREDKIM CHEMICAL EARTHING

❑ B. MODEL- AKE0348 (48mm x 3000mm)

10) GBFC(Ground Back Fill Compound) :-

- I) Minimum 50kg it is soil enrichment chemical mainly consisting of **Aluminum Silicate**.
- II) It absorbs moisture but doesn't get dissolved in water.
- III) It can absorb water 13 times of its weight.
- IV) The top & bottom of the pipe is sealed permanently.

11) Earth fault capacity:-

350KVA

12) Surface Area:-

452160mm

13) Brand:-

Alfredkim

14) Manufactures:-

ALFREDKIM SYSTEMS & SOLUTIONS PRIVATE LIMITED

14/3, Bolton Compound, Mathura Road, Faridabad-121003, Haryana (India)

www.alfredkim.net

SPECIFICATION FOR ALFREDKIM CHEMICAL EARTHING

□ C. MODEL- AKE0276 (76mm x 2000mm)

1) Type of Earthing:-

Sealed maintenance free chemical filled earthing electrode.

2) Diameter of the pipe:-

76mm

3) Thickness of the pipe:-

3.9mm

4) Length of the pipe:-

2000mm

5) Galvanized Thickness:-

80-100micron

6) Type of galvanizing:-

Hot dipped

7) Size of the conductor:-

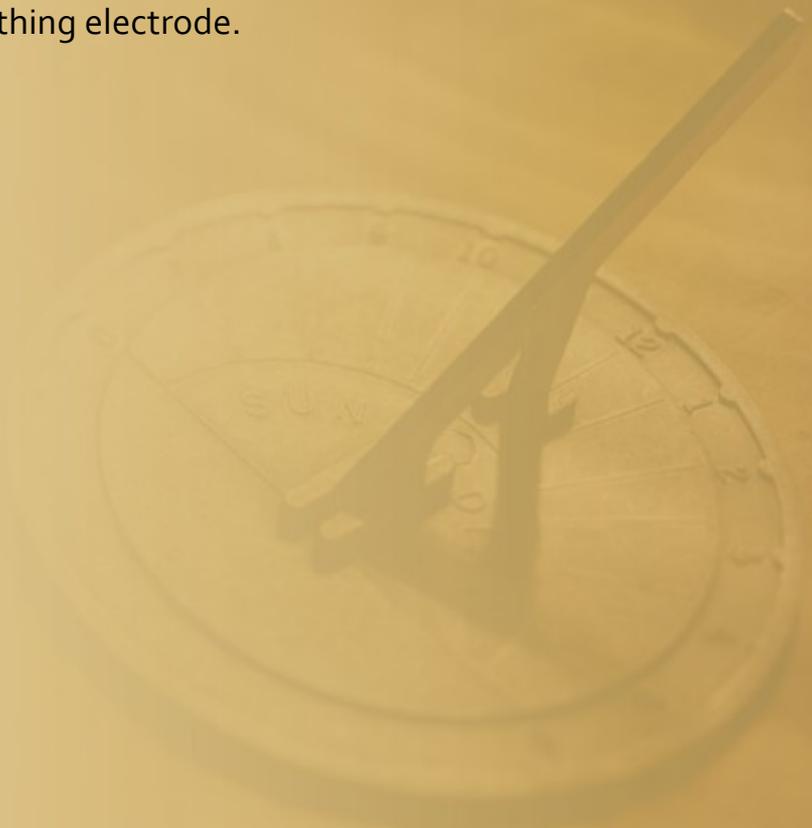
40x6 G.I. strip

8) Terminal diameter:-

14mm

9) Chemical used in the pipe:-

CCM Approximate Weight -8 kg



SPECIFICATION FOR ALFREDKIM CHEMICAL EARTHING

□ C. MODEL- AKEo276 (76mm x 2000mm)

10) GBFC(Ground Back Fill Compound) :-

- I) Minimum 50 kg it is soil enrichment chemical mainly consisting of **Aluminium Silicate**.
- II) It absorbs moisture but doesn't get dissolved in water.
- III) It can absorb water 13 times of its weight.
- IV) The top & bottom of the pipe is sealed permanently.

11) Earth fault capacity:-

650KVA

12) Surface Area:-

477280mm

13)Brand:-

Alfredkim

14)Manufactures:-

ALFREDKIM SYSTEMS & SOLUTIONS PRIVATE LIMITED

14/3, Bolton Compound, Mathura Road, Faridabad-121003, Haryana (India)

www.alfredkim.net

❑ **SUBJECT: - Install ALFREDKIM CHEMICAL EARTHING.**

Prevent Electrical Hazards!!

We are a professionally managed upcoming company engaged in providing latest Earthing/Grounding systems and solutions ensuring Safety of *Property, People and Equipments*.

A. Need for Protection!

To protect Industrial, commercial, and residential Buildings with proper electrical earthing

Reasons:

1. Lightning Damage
2. Electrical leakages
3. Short circuits between phases / between phase and Neutral
4. Surges in Supply line

Why Earthing?

Effective Earthing in the building protects People, Property and Equipments.

Result:

Protection of persons within the building who are occupants as *owners or tenants* or employees or visitors or residents

Type of Hazards:

Electric fires resulting in loss of Property and loss of Human lives in these devastating tragic fires.

Good Earthing:

ALFREDKIM chemical earthing is like an *insurance* for protection of *property, people and equipments*.

Any compromise on quality or absence of earthing is willful act of inviting *electric hazards* in the installation

B) Why Electrical /Electronic fail to perform to optimum in industry and commercial buildings.

The electrical /electronic equipment e.g. UPS system, Computers, CFL lamps, Eapbx, ac/dc VFD, Speed Drives, CNC Machines, Printing Machines, Machine tools with electronic controls, Welding machines, Lifts, EOT cranes and all such devices fitted with PCB/electronic cards have tendency to distort the sine wave of AC supply thereby causing the resultant unbalanced voltage leading to Higher Voltage between Neutral and earth *which lead to higher neutral currents which sometimes are 1.73 times of the phase currents.*

Hazards Prevented:

Poor performance of the above equipment resulting in loss of production and loss of man hours i.e. idle man hours due to equipment failure or inefficient operation and additional rupee expense on maintenance

Malfunctioning of equipments:

Why electronic Equipment Malfunction Specially in the IT Industry e.g. call centers, BPO's and similar industries in particular.

The electronic circuits in this equipment are operating at different switching voltages as per the design of the individual manufacturers therefore it is essential that voltages between neutral and earth are maintained to minimum level so that the PCB's/*electronic cards are not damaged due to high neutral currents and unbalanced voltages.*

A. ZINC:-

Zinc oxide will be formed during the process naturally as the mineral zincite.

Solubility:

Practically insoluble in water; soluble in dilute acetic or mineral acids, ammonia, ammonium chloride, ammonium carbonate, and fixed alkali solutions; insoluble in alcohol.

It exhibits piezoelectric characteristics in thin film form. Such thin films can be deposited by process like sputter deposition. Zinc oxide is also luminescent and light sensitive. Zinc oxide is a unique *Dielectric Strength* material that exhibits semiconducting and piezoelectric dual properties.

Zinc oxide finds applications in: VARISTORS which are used to prevent voltage surges in devices like mobile phones.

Flammability: Zinc oxide is not combustible.

Extinguishant: Used as an extinguishant that is suitable for the materials involved in the surrounding fire.

Metal – Protective Coatings:

Zinc metal powder (zinc dust) and zinc compounds have long been utilized for their anticorrosive properties in metal-protective coatings, and today they are the basis of such important especially metal primers as Zinc Chromate primers.

Zinc dust-Zinc Oxide paints are especially useful as primers for new or weathered galvanized Iron. Such surfaces are difficult to protect because their reactivity with organic coatings leads to brittleness and lack of adhesion. Zinc dust-Zinc Oxide paints however, retain their flexibility and adherence on such surfaces for many years. Zinc dust-Zinc Oxide paints also provide excellent protection to steel structures under normal atmospheric conditions, as well as to steel surfaces in such under-water conditions as dam faces and the interior of fresh water tanks.

CONCLUSION:-

In view of the facts given above it is recommended to use the Galvanized steel strips against the convention copper strips

COPPER:

Metal oxides are generally not very good conductors. In fact, most are Dielectrics and hence non-conductors.

Certainly, Copper and aluminum are much better conductors than their corresponding Oxides at any temperature linemen will encounter.

Copper, lead, and aluminum oxides formed by corrosion are decidedly poor Conductors. I am not an electrical engineer but I know if I let the terminals of a battery become corroded, the battery no longer delivers electricity (i.e. the corrosion products are insulators).

Most metals, including copper and aluminum, form thin metal oxide film layers when exposed to air for even a brief time -- this is what makes turn dull after a few days or weeks.

Copper is generally used as TINNED COPPER to avoid oxidation effect on the bare copper conductors when used.

The Termination is generally done by soldering the multi strands of copper wire for effective termination and to avoid oxidation at the point of contact.

The termination at bulk loads is normally done by LUGS duly filled with soldering compounds or by very effective Crimping.

The copper oxide is poor conductor is proved by the practice of cleaning the copper contacts in the Switchgear by emery paper /sand paper periodically to maintain the contact conductivity.

The copper get deteriorate due to oxidation and get pitted in switchgear contacts due to oxidation requiring replacement of contacts.

The above points prove the inefficacy of copper conductivity due to oxidation and it is our daily experience of electrical engineers.

Note:-

The current density of copper with respect to iron /zinc is of course higher and it is taken care by using a better cross section of ear thing strips i.e 40x6 mm (240sq mm) or 30x6mm(180 sqmm) where as in copper strips the cross section will be much smaller for the same design.

An example of the chemical earthing as per the following specification which can be compared with the other systems for your analytical reference.

Our specs:

e.g. Dia: 50mm

Length: 3000mm

Strip Size in the Pipe: 40x6mm

The Hollow pipe is filled with Chemical: Known as CCM (This is used to dissipate the heat generated due to Phase to Phase and Phase to Earth fault Which is very high and cause of all electrical Hazards and fires)

Gem (KIMMOIST): 50 Kilos which is used to maintain the moisture in the earthing system for its efficient working.

The electrode is installed 3 mtr deep and is surrounded by ***the 50 kilos of GEM in thick slurry to maintain the moisture level for long period of time.***

THREE PARAMETERS FOR SUCCESS OF EARTHING:-

- A. capacity to clear the fault current-** avoid electrical Hazards
- B. To dissipate the heat** – to avoid the failure of earthing system
- C. To maintain the moisture level** - to achieve the low ohmic values

ALFREDKIM Earthing meets the three parameters as under:

- 1) You will observe that ***success of the earthing depends on the capacity to carry the fault current.***-We use 40x6mm G.I. strip surrounded by CCM which is Semi metal.
- 2) ***The heat is dissipated because of CCM filled in the pipe which has a melting temperature of 2500°C.***
- 3) The GBFC has a property to ***absorb water 15 times of its weight and doesn't dissolve in the water.*** It remains wet for a very long period of time

Please Note:

- 1. The Right size of earthing system is necessary and will work satisfactorily. The undersized earthing should be avoided for long term safety of installation.***
- 2. In case the fault current of full capacity takes place then the earthing system can fail because of inadequate dissipation of heat which may result in to electric fires and other hazards to life and property.***
- 3. The earthing is not taken as formality but as a necessity for electrical safety.***
- 4. Our price of Rs. 7550.00/- (Exclusive of VAT) exclusive of installation and transport is worth paying for safety of the plant, machinery and building rather then compromising with quality of earthing system.***
- 5. Please consider the Price paid for this earthing as insurance for your Plant, Machinery and building and not as an expense.***
- 6. A good Earthing will save your down time on repair, maintenance and loss of production hours.***

Reasons of Grid Earthing: -

1. To manage very high fault currents So that the low ohmic value of earth resistance will reduce the effective watt loss thereby controlling the heat generated in the system.
2. To maintain very low level of ohmic values of earth resistance like 0.1, 0.2 etc. so that the sensitive electronic equipment don't malfunction & there electronics cards & PCB's don't fail & get damage electrically.

System at a Typical Plant:-

1. The connected loads at the plant for each equipment are not heavy.
2. The reason for maintaining the value of low resistance is desirable for preventing the malfunctioning of the electronic equipment & there electronic cards.

How can we maintain the low ohmic earth resistance:-

The examples are given below:-

Formula to calculate the Resistance in Parallel:-

If there is n resistance connected in parallel.

$$1/R=1/R_1+1/R_2+1/R_3+1/R_4+-----+1/R_n.$$

When three earthings are used in a GRID:-

CASE-I

$$R_1=0.6, R_2=0.8, R_3=0.4$$

$$1/R=1/0.6+1/0.8+1/0.4$$

$$1/R=1.66+1.25+2.5$$

$$1/R=5.41$$

$$R=0.18 \text{ ohms.}$$

CASE-II

$$R_1=0.4, R_2=0.8, R_3=1.2$$

$$1/R=1/R_1+1/R_2+1/R_3$$

$$1/R=1/0.4+1/0.8+1/1.2$$

$$1/R=2.5+1.25+0.833$$

$$1/R=4.58$$

$$R=0.218 \text{ ohms.}$$

WHAT IS SYSTEMS OF GRID EARTHING?

When four earthings are used in a GRID:-

CASE-I

$$R_1=0.4, R_2=0.6, R_3=0.8, R_4=1.2$$

$$1/R=1/0.4+1/0.6+1/0.8+1/1.2$$

$$1/R=2.5+1.67+1.25+0.833$$

$$1/R=6.25$$

$$R=0.16 \text{ ohms.}$$

CASE-II

$$R_1=0.5, R_2=0.7, R_3=1.0, R_4= 1.2$$

$$1/R=1/0.5+1/0.7+1/1.0+1/1.2$$

$$1/R=2+1.43+1.0+0.83$$

$$1/R=5.26$$

$$R=0.19 \text{ ohms}$$

We have given two cases for each type of grid earthing i.e. **three earth systems & four Earth systems.**

Our recommendations are for four earth systems to maintain a long term low ohmic values because of the following factors:-

1. Change of a soil condition for a period of a time is choosing a different location for the earthing system in the same premise.
2. Change of climatic condition:
 - a. Extremely dry climate- **SUMMER**
 - b. Extremely cold climate- **WINTER**
 - c. Extremely humid climate-**RAINS**
 - d. Occasionally scanty rain fall which is assumed to be less than 250mm in a year which is unlikely in any geographical location.

Our recommendations are based on the effect that the equipment will work through out the year in all climatic condition.

Why Earthing Near To the Equipment?

Question: *Should it be near to the point of application/Equipment or away from it?*

Answer: It must be near to the point of application.

Reason:

Please read on!

1. OLD TRADITIONAL SYSTEM:-

- I) The conventional pit type copper plate Earthing with large Quantity of Charcoal & Salt was requiring large area of about 4'x3' or 6'x4' & depth used to be 20' to 60' (7 to 20 mtr) depending on the soil condition.
- II) This much area was conveniently available in the factories/office premises **in earlier days when the space was not constraint.**
- III) **The distance between the earth pit & the point of application used to be few meters may be 50-100mtrs & therefore to maintain the low resistance of the earthing wire from the earth pit to the machinery the copper wire of 8/10 swg was used.**
- IV) The copper wire thus used was cash & carry item for professional wire cutters who used to cut the wire at the first opportunity there by disconnecting the earthing system & causing an electrical danger to the system.

2. PRESENT MODERN SYSTEM:-

- I) The space is become expensive & in short supply.
- II) The conventional pit type earthings is very cumbersome, laborious & occupies more space in term of sq. mtr & it is being replaced with chemical pipe earthings.

Why Earthing Near To the Equipment?

III) The advantages of pipe earthing are:-

- a) It needs a bore of 250-300mm dia & the depth of 2 to 3 mtr.
- b) It is a neat & clean installation.
- c) Doesn't spoil the look of the office or factory.
- d) It is conveniently covered up which can be flagged showing the location of the earthing.
- e) The pipe earthing is a compact unit & can be installed very near to the equipment hardly 2-5 mtr away from the equipment.
- f) The closeness of the earthing has a advantage of **providing very low resistance value to the system** which requires less length of the wire (**AS resistance is directly proportional to the length i.e. the smaller the length, it is better for earthing**)
- g) Since the **length of the earthing is required is very small** in the installation of pipe earthings due to nearness to the equipment.
- h) The **G.I. strip of cross section area of 10x3mm** or more are used for connecting the pipe electrode to the equipment.
- i) G.I. wire is not favorite of wire cutters so there are **no chances of disconnection of wire cutting or theft.**
- j) The **copper wire of 8/10 swg which was used earlier** were subjected to **more mechanical damages** because of very low cross section area & the **round wire is more subjected to more cross sectional damage than the rectangular strip of 10x3 mm or above.**

CONCLUSION:- In view of above application the **earthing electrode close to the point of application or equipment are more desirable for electrical & electronics equipment** which demand **low value of ohmic resistance through out the year under all working condition i.e. extreme dry ,extremely cold or wet climates.**

WHY DISCARD PIT TYPE EARTHING?

The conventional copper pit type earthing is out of date because:-

1. **The water level is going down** at most of the geographical areas & therefore one has to dig deep holes may be to the extent of 20-50 mtr.
2. The commonly used substances in pit type earthing were *sodium Chloride known as common salt, soft coke & charcoal.*
3. *The common salt (sodium chloride) is a hygroscopic substance & it gets dissolved in water & losses its hygroscopic properties when become water itself.*
4. The salt is known to be a **corrosive electrolyte** which decays the pipe and the conductor used for earthing. *Due to decay one does not get the consistent ohmic values.*
5. *The soft coke & charcoal tend to become ash* due to heavy heat generated by heavy electric fault currents generated in the system especially at higher voltages at 1.1kv, 3.3kv, 6.6kv, 11kv, 33kv, 66kv and 133kv transmission distribution line & at substation.
6. The heat generated is proportional to I^2Rt (Time in seconds) e.g. if the fault current of 10,000amps in the system with an earth resistance 2 ohms as permitted by IS in 0.1 seconds is given as under.

$$H=I^2Rt$$

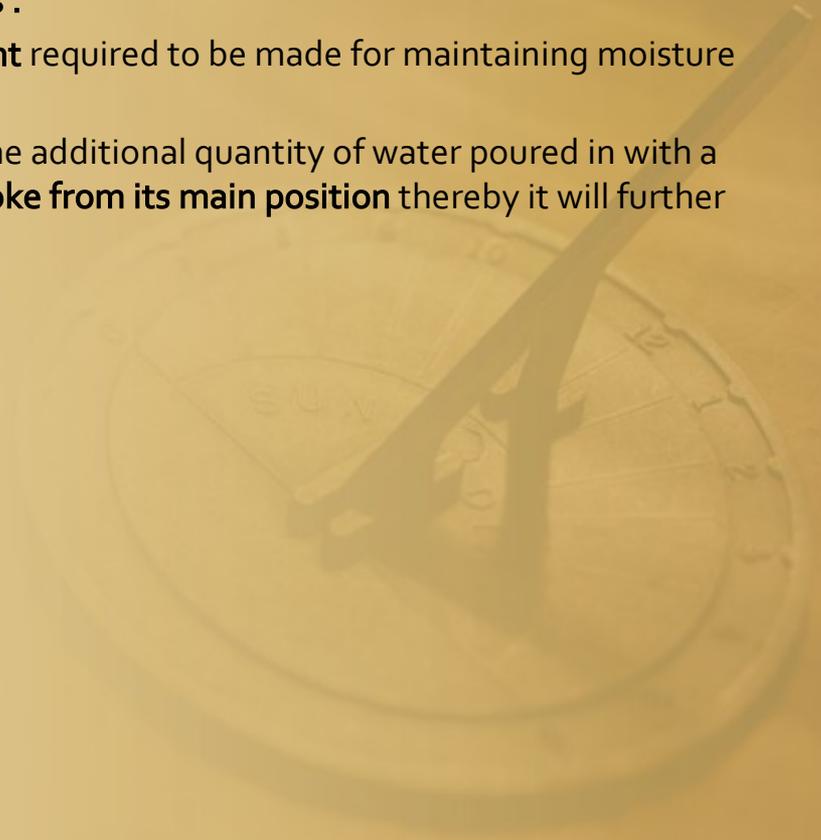
$$H=10,000 \times 10,000 \times 2 \times 0.01 = 20,00,000 \text{ calories} = 1053 \text{ }^\circ\text{C}$$

This much heat generated in one fault. Assuming 6 faults in a year then in a period of four year -24 faults occur, each fault generating 1053 °C & above.

7. Each fault of this magnitude will turn the **soft coke/ charcoal into ash** gradually in a period of 3-4 years. *The earth system will deteriorate and give larger value of ohmic resistance thereby endangering the entire installation consequently people & property.*

WHY DISCARD PIT TYPE EARTHING?

8. If the ohmic values goes up from 2 to 3 ohms because of faulty earth systems heat generated will be 30,00,000 calories (i.e. 1600 °C)this results that *the pit type earthing is inefficient, not reliable & cause serious damage to life & property* in a period of 3-4 years .
9. It is therefore observed that **separate watering arrangement** required to be made for maintaining moisture through a **separate pipe dug along the earthing system**.
10. Instead of water producing the moisture in the earth pit the additional quantity of water poured in with a **natural rain fall will wash away the charcoal & the soft coke from its main position** thereby it will further deteriorate the functioning of the earth system.



WHY SWITCH TO CHEMICAL ELECTRODE EARTHING?

The above points conclude that pit type earthing is out of date and it is being replaced and preferred over chemical pipe earthing for reasons given below:-

1. The pipe for the chemical earthing are generally 2 mtr or 3mtr in length therefore the *earth bore need not more than the 250 to 300mm dia & maximum depth of 3mtr.*
2. **The moisture is maintained at a small depth of 3mtr by using ground enhance material, commonly known as KIMMOIST (Grounding Back Fill Compound).**
3. The efficiency of the chemical earthing to maintain the moisture which is essential for low ohmic values of earthing resistance is **due to use of hygroscopic chemical** . which absorb the moisture but doesn't get dissolved in the water unlike salt.
4. **The heat generated due to electric faults developing heat of 1060 °C and above is resisted by CCM (Crystalline Conducive Material) which can withstand upto 2500°C.**
5. *The CCM is filled in the pipe of appropriate dimension of 48mm or 76mm dia and sealed at both ends. It incorporates the earth conductor of GI strip of suitable size of 30x6mm or 40x6mm depending upon the individual design of manufacturer.*
6. The CCM filled in the pipe being a good conductor increases the fault current capacity of the system because the pipe is hollow *but when filled with CCM it behaves like almost solid pipe.*
7. The CCM resists *cracking, warping, shrinking, or distortion even when temperature exceed 2500 °C* due to severe repeated electric faults which may happen in operations over the year.
8. The GI pipe used are adequately galvanized (80-100 microns) as per IS -3047 1987.

WHY SWITCH TO CHEMICAL ELECTRODE EARTHING?

9. *Zinc oxide will be formed during the use of the earth system. Zinc oxide has following advantages over the conventional earthing which uses the copper plate or copper conductors:-*
- a) Zinc oxide so formed is **insoluble in water.**
 - b) Zinc oxide has a **unique Dielectric strength** that exhibits **semiconducting & piezoelectric dual properties.**
(Unlike in copper where the **copper oxide is a bad conductor of electricity & becomes powdered Red Oxide (Copper Oxide)** under high fault current that generate high temperatures)
 - c) ZnO finds application in **Varistors** which are used to **prevent voltage surges** in the electronic devices like mobile phone.
 - d) ZnO is **not combustibile & used as a fire extinguishant material.**

CONCLUSION:- The industry, project managers & the electrical consultants find it very convincing to use & specify the chemical pipe earthing which is **convenient to install, no maintenance what so ever with a long life of over 15 years.**

Why Control Floating Neutral Voltage?

1. All Neutral should have Zero Potential Difference.
2. Why Neutral Voltage is Noticed Now a Days.

Reasons for Neutral voltage:

- A. The use of electronic equipment /ups/computers /CFL lamps/Speed drives etc. These devices on operate at different cut off voltages in the sine wave cycle and hence the sine wave is distorted resulting in the higher PD in the Neutral and cause **the flow of currents in the Neutral Circuit which results in the damage of PCB cards and other sensitive components in the electronic circuit/equipments**
- B) The Industrial loads are in general **Not Balanced** Loads and therefore the line voltages are **spill over** to Neutral **which results into stray currents thereby damaging the electronic equipments/ PCB cards**

Why Neutral Grounding.

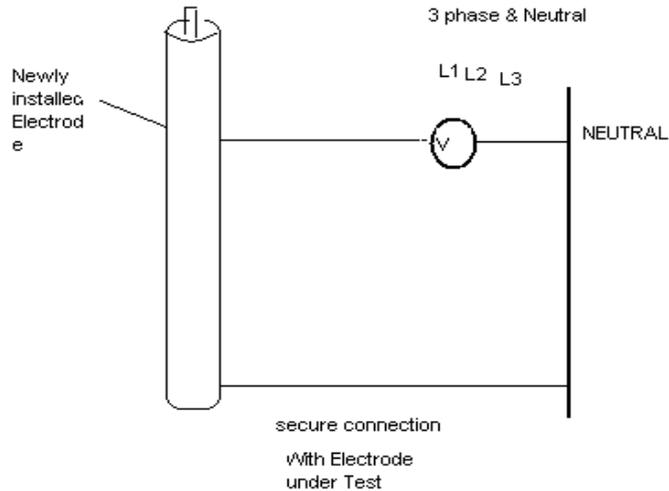
- A. To maintain the ZERO PD between the Neutral and earth and to ground the **Spill over** voltages the Neutral is grounded.

It is therefore very necessary to **immediately connect Neutral to the Earth by Solid Permanent contact so that there is no possibility of loose connection /disconnection at any stage OF OPERATION to prevent any electrical mishaps.**

Method of testing the New Earth Electrode

- A) Connect the New Electrode to the Neutral of Supply Line by very Good secure Connection Either Bolted or soldered.
- B) Connect the Volt meter as shown in the Picture (P1) below.,
- C) *When the Neutral is properly grounded and the earthing is Successful the voltmeter should give Nearly ZERO voltage between Earth and Neutral*

Why Control Floating Neutral Voltage?



- A) Electricity finds always easier path to flow therefore the spill over voltage in the neutral will go to the newly installed earth electrode. In case earthing is not successful or has higher ohmic value of resistance or loose contact/ disconnection in the earthing circuit the voltmeter will show the undesirable voltage. In case the earthing is ok and correctly done the voltmeter will show almost Zero Volts.

Kindly follow the above testing methods and ensure the testing is properly done.

1. Pak diplomat electrocuted by faulty hair dryer in Delhi

7 October 2009

Rahul Tripathi | TNN

New Delhi: An unfortunate act of carelessness claimed the life of a 49-year-old Pakistani diplomat in the capital on Sunday straight out of a bath, Mohabat Khan Afridi had tried to use a defective hair dryer, leading to fatal electric shock.

Afridi, who lived in DBlock , Vasant Vihar in south Delhi, was the political counsellor at the Pakistan High Commission since 2007. He is survived by his wife and three children. Afridi was a native of Kohat in Pakistans North West Frontier Province.

On Sunday night, the diplomat went for a bath, carrying his hair dryer along. His wife told us that the hair dryer was damaged and used to give out electric shock about which she had warned Afridi. It appears that after the bath, Afridi was using the dryer when he was electrocuted around 8.30pm. He might have tried to raise an alarm but since the bathroom door was locked, no one heard him, said a police officer.

The body was discovered around 10.30pm by Afridis wife, Fahima, and other staff at their ground floor house. They went to check in his bedroom when he was not seen for a long time and found the bathroom locked from inside . When there was no response on knocking, they broke down the door and found him lying on the floor. They immediately took him to Fortis hospital, said the officer. Doctors, who declared him brought dead, said Afridi had died due to electrocution and there were no apparent injuries on his body.

2. The Case of Stray Voltage in a Lake

October 1, 2009 By Donald R. Johnson, P.E., Johnson Engineering

Faulty concentric neutrals on high voltage underground cables was the cause of one drowning death and brain injury to two others while swimming in a lake.

Stray voltage is a popular term resulting from electrical currents flowing through the earth, or other conductive surfaces not normally expected to carry electric currents. Small amounts of electric currents travelling through the earth are prevalent throughout the nation primarily due to electric utilities using the earth as a grounding medium for grounded wye distribution systems. Even though these grounded wye systems do carry a neutral conductor return current path since the neutral conductor is grounded to the earth at multiple locations, (as required by the NESC), the result is the earth is a parallel path for these currents. Typically, depending upon the conductivity of the earth and the amount of return neutral current on the electric distribution system, the amount of current flowing through the earth is small. As electric loads across the nation continue to increase, these earth currents are also increasing. These earth currents became noticeable many years ago on dairy farms. The dairy farmers noticed a significantly higher mortality rate among the dairy cows along with a major loss of milk production. The culprit was directly tied to the amount of earth currents flowing through the dairy facilities. Electric utilities across the nation have found out the hard way (through multi-million dollar lawsuits) that they must reduce these earth currents to non-damaging levels.

The Scene:

Six teenagers were enjoying a cool evening in an outdoor hot tub in a home near a small lake. Several of the teenagers decided to exit the hot tub and run out onto a small dock (owned by the homeowner) and jump into the lake. Photo of the dock where the accident occurred.



The Accident:

The teenagers were swimming near the dock for several minutes when they began to notice electric currents flowing through their bodies. One boy who experienced the phenomena at the site describes the currents as causing him to lose muscle control such that he could no longer swim and he began sinking in the water. Several of the teenagers that were on the dock saw the swimming teenagers' plight and called to the adults in the house for help. Several of the adults came running out, called 911, and began diving into the water trying to retrieve the teenagers that were under the water (Note: It was determined during later testing that the currents in the water were intermittent thus not causing damage to the adults.). After multiple dives the adults were able to retrieve the two boys and one girl that were under the water. CPR was immediately administered until the paramedics arrived. After the three were taken to the hospital the outcome was that one boy drowned and the other boy and girl received brain damage due to lack of oxygen caused by near-drowning.

The Investigation:

The first thoughts by those at the scene after the accident was that the dock wiring was somehow faulty which caused the electric current to be in the water. My services as a professional electrical engineer were then engaged by attorneys representing the plaintiffs (who filed suit against the electric utility and others) to try to determine the cause of the electric currents in the lake water. After numerous investigations by me and other experts, it was determined that the dock wiring was not the cause of the electric currents in the lake water. I later determined through discovery from the electric utility that they had major corrosion problems with the bare concentric neutrals of their high voltage underground cables that were buried under and around the lake where the accident occurred.

The electric utility realized up to nine years prior to the accident, through concentric neutral testing procedures, that the bare concentric neutrals were in a serious state of deterioration throughout the lake area and the housing subdivision around the lake. Even though the electric utility realized the problems they were having with the deteriorated concentric neutrals in the area they didn't seem to realize the importance of immediately fixing the problem. They began a multi-year program of replacing the bare concentric neutral cables with new jacketed concentric neutral cables in the area. However due to difficulty in installing new cable in two particular sections of underground cable under and around the lake, these sections were not replaced. It turned out that these two particular sections of underground cable that were not replaced were the primary paths for the neutral current return for the entire lake area subdivision back to the electric utility substation source. The result was that the electrical load within the subdivision was essentially on an "island" in terms of an adequate return current path. Because of this "island" effect the currents took the least resistant path into the lake water heading to the dock which was more than adequately grounded to the electric utility system overhead neutral which was then tied directly to the utility substation source.

To verify the above scenario numerous tests were completed by me during several site visits. During one visit a Fluke Model 289 recording multimeter was installed at the dock where the accident occurred and left to record for eight to ten consecutive days (The wiring to the dock was totally disconnected and removed at this time.). The voltages were recorded by placing a ground rod off the end of the dock into the lake water where one meter probe was attached. The other meter probe was attached to the house ground which was in turn attached to the electric utility ground. A 500-ohm shunt resistor was included in the voltage measuring circuit. The currents were measured using the same technique however the 500-ohm resistor was placed in series with the circuit.

The results of the testing indicated that both the voltage and current levels followed the electric loads of the utility in that the load peaks were at the highest levels during the morning and evening hours (Note that the accident occurred during the evening hours when electric loads were at the highest.). In addition the frequency of all voltage and current measurements were measured at 60 Hz. This was a direct indication that the electric utility was the source of these measured voltages and currents. The highest currents measured during this test period reached .5 amperes and the highest voltage reached 6.2 volts.

During another visit to the site, with the electric utility present to allow access to their underground cable junction enclosures, numerous readings were conducted to measure the current on both the underground electric utility energized phase conductors and the concentric neutrals. Voltage measurements were also taken from the ground system in the enclosures to a remote ground. The results indicated that indeed the concentric neutrals in the two particular critical sections were likely non-existent. In one particular section right near the lake the neutral current on the concentric neutral was less than one-tenth of an ampere whereas the energized phase current was in excess of 6 amperes. Obviously the remainder of the return current was flowing through the earth and in this case the lake water. In addition the voltage measured from these same junction enclosures was in excess of 7 volts to a remote ground rod. These measurements were a clear indication that the concentric neutrals on these underground sections were likely absent due to corrosion.

The Conclusion:

Using an assumed human body resistance of 3000ohms^1 when immersed in fresh water and assuming a current range through the human body where muscle control is lost in the range of 6 to 30 milliamperes² using Ohm's law the voltage necessary to cause a drowning in fresh water is in the range of 1.8 to 9 volts, 60 Hz AC. The above testing results show that the necessary voltage and current levels were at a level well within the range to cause the drowning and near-drowning of the victims of this case.

This case went to a trial by jury and the jury awarded the plaintiffs a total judgment of \$2,325,000. No appeal was filed by the electric utility defendant.

This case shows the dramatic effects of stray voltage especially in an area where people are exposed to stray voltages when in a wet environment. Electric utilities must be vigilant in maintaining their distribution systems such that stray voltages are kept at extremely low levels such that humans and animals alike are not exposed to these dangers. As electric loads continue to increase across the nation many experts are even encouraging electric utilities to modify their distribution systems so that the earth is not used as a current carrying medium.

Why water new earth bore?

When the pipe earthing /chemical earthing/maintenance free earthing/Gel earthing or whatever name it is called by various manufacturers the watering of the bore is necessary for the following reasons.

- a. Unlike pit earthing where the salt (NaCl) & coal is used with copper plate, the pit is dug very deep approximately 40ft to 70 ft. depending on soil conditions where the dampness/moisture is achieved at various level of depth.
- b. In case of the modern type of earthing which is free from future maintenance .The watering of the bore prior to installation is necessary for the following reasons.
 1. The depth of the bore is either 2m/3m (6ft/10ft) which is much less than the normal depth required in pit earthing.
 2. The diameter of the bore is also limited to 200/300mm against the pit earthing which is almost in square meters.
 3. Unlike salt which is used in pit earthing which dissolves in water and salt it self becomes water in the course of time and dries it self, thereby loosing the conductivity in surrounding of the pit. Salt itself reacts with copper & makes copper chloride & other corrosive chemicals which corrode the copper plates.
 4. The GEM used by us absorbs the water upto 13 to 15 times its weight & dosen't dissolve in the water therefore it retains its moisture property upto the lifetime of the electrode which is more than 25 years as it contains soil friendly materials.
 5. Since there is no need to recharge the pit as the GEM will remains moist through out the life, therefore it is desirable and absolutely necessary to keep watering the bore for three to four days continuously before installing the electrode and filling it with GEMso that the GEMwill have moist bore available with enough water soaked in the bore due to continuous watering before installation.

6. After the installation no watering is necessary *for future maintenance* in whatever soil condition it has been installed either indoor or outdoor installation.
7. The earthing is quite successful in the normal climatic condition where the average rain fall in a year may not exceed 250mm. This will give enough moisture to the soil.
8. This earthing is being recommended by most of the consultant in desert areas where there is scanty rain fall in desert areas where the water level to achieve the normal dampness is very-very deep.
9. Since we are able to achieve required dampness in a depth of 2 to 3 meters with continuous watering of the bore & adequate quantity of the GEM filled at the time of earthing which remains moist for the rest of life & maintains the good ohmic values of earth resistance.
10. To conclude the old copper pit type earthing is out of date & maintenance free earthing is easy to install, occupies less space & economical in the long run.

HOW TO SELECT & INSTALL ALFREDKIM EARTHING SYSTEM?

The chemical earthing system is provided in the form of electrode of G.I Pipes of different lengths & diameter of the pipe.

The annexure A, B, C and D are attached on page no.8-11 giving the dimensional details.

The selection of earthing system:

Earthing will be selected on the basis of expected fault current in the installation that is depending upon following factors-

- 1) Connected load
- 2) Capacity of D.G. Set
- 3) Capacity of Transformer
- 4) Factor of safety taken into consideration by design engineers & project managers handling the project
- 5) Calculation of fault current is done as under on the type of faults mentioned below:-
 - a) Fault can be either Phase-to-Phase
 - b) Fault can be Phase-to-earth/neutral

Calculations are based on full load current 1.4 amp/kVA under normal power factor in the system

Impedance level generally taken are 5% of the capacity therefore the fault current will 20% times of transformer on the secondary side (e.g. 100 kVA transformer will have full load of 140 amp and therefore expected fault current in the worst condition of fault happening on the immediate secondary of the transformer and hence the fault current will 2800 amps

The fault at the point of installation of equipments will get reduced depending on the distance of distribution of transformer and hence impedance of length of cable will come into play & fault current can be calculated upon the size of length of cable used, on the common sense approach and practical experience of the project managers

HOW TO SELECT & INSTALL ALFREDKIM EARTHING SYSTEM?

Installation procedure:-

Unlike Copper pit type earthing which used to be installed away from the equipment because it was cumbersome to install the earthing near to the equipments because of restriction of the space and other environmental factors.

Now condition has changed, chemical earthing is very compact and easy to install and placed near to the equipments may be 2-3 meters away depending on the situation.

Test Results:-

The results obtained will be as under:

Earthing installed in a bore of 8-10 inch of diameter of appropriate length depending upon size of electrode used.

The electrode is installed in the bore and additional space surrounding the electrode is filled with the slurry of

35-70kgs of **GEM -KIMMOIST-(Al₂O₃ SiO₂ H₂O)**.

The tests are carried after one week of the installation of the electrode. This time factor is necessary to allow curing time for the chemical to mix with soil conditions.

The results are obtained by Earth resistance measuring meters which are basically version of **Wheatstone bridge method used for measuring the Unknown values of resistances.**

The Values obtained are well within the limit given as per IS: 3043-1987 i.e less than 2 ohms. In practical sense the values obtained are between 0.5 to 1.5 ohms depending upon the soil conditions (Resistivity of Soil) of the location

The test certificate is provided by the manufactures certifying the values obtained.

The above data should suffice for clients.

A CONCLUSION!

Why Chemical Earthing is more DURABLE AND RELIABLE?

1. LIFE OF EARTHING SYSTYEM:-

A. COPPER PLATE:-

1. The conventional copper pit type earthing has a very erratic behavior and the ohmic values of earth resistance vary drastically on the following seasonal factor:

a) SUMMER SEASON

b) WINTER SEASON

c) RAINY SEASON

The humidity factors in all the seasons vary because ambient temperature of ground varies. The thumb rule for calculating humidity at a 20°C ambient temperature and 1° variation in either side (+/-) will vary the humidity level in the ground by 16%. You can now understand why the ohmic values remain erratic during the life of the system.

There is a general accepted fact and practice that pit type earthing is watered through an additional pipe running through the depth of pit in summer season obviously because of dry climate and low humidity.

Contrary to the belief that winter is a wet climate and has a higher humidity level it is a myth and humidity is very low in winter because the ambient temperature is in the vicinity of 4 to 6°C and as per the formula given in the paragraph one the humidity is reduce by 16% of every degree of temperature. The humidity is reduced by $16 \times (20-6) = 224\%$. This open secrete and it can be very frank to the newspaper report under the heading "Today's Weather".

The coal used in the earthing pit burns and turns into ash under high level of fault currents and on the top of it the quality of coke is used is very poor(Generally in Powder form).

The salt used becomes water itself and looses its hygrosopic properties.

Conclusion: The life of pit type of earthing is not more then 3 years irrespective of maintenance.

A CONCLUSION!

Why Chemical Earthing is more DURABLE AND RELIABLE?

B. Chemical Electrode earthing:-

In the above type of earthing the following important factors are taken into consideration:

- a) The hollow pipe used in the chemical pipe earthing is fitted with a G.I. strip 40x6mm and CCM (Crystalline conductive mixture) is compressed in to the pipe and pipe is sealed at both the end.
- b) CCM is a semi metal and the hollow pipe filled with CCM behave like a salt pipe and therefore the current carrying capacity increases substantially.
- c) The CCM has a high melting temperature of 2500°C and unlike coal it will not burn into ashes under high temperatures of 1500°C under high fault currents occurring due to phase to phase or phase to earth fault.
- d) The humidity factor (The moisture level) is maintained by KIMMOIST (GEM) surrounding the electrode in a slurry form. The KIMMOIST has a property of absorbing water 15 times its weight and doesn't dissolve in the water. It remains moist and soft through out the life. A minimum rain fall of 2.5 cm in a year makes the KIMMOIST moist and humid for next one year and therefore the cycle keeps on repeating year of year. Therefore, because of quality of KIMMOIST no additional watering is done whether in summer, winter or rainy season i.e. under any climatic condition.
- e) In India the technology is only 11 years old and the failure record is almost negligible. The earthing system properly installed under the guidance of manufacturers can safely vouch for minimum ten years.

Conclusion:- The life of chemical earthing as per the reports from USA and other country is more than 15 years with no failure records. Some company in USA guarantees life of 30 year or may be above. They fear that metal may erode due to chloride and oxides are formed due to under ground chemicals.

A CONCLUSION!

Why Chemical Earthing is more DURABLE AND RELIABLE?

2. GRAPHICAL REPRESENTATION:-

A. COPPER PLATE:-

The conventional copper pit type earthing has a deterioration factor in 3 years and maintenance every year the watering down the pit. The ohmic values will measure at the different period of the year vary drastically and sometimes reach failure level. There is no data available as the earthing installation is not done in the organized sector so far and only in hand of unqualified, illiterate traditional electrician without any electrical license whatsoever who used the quality of copper, the poorest quality of coal (Powdered coal) and third grade quality of salt and complete the earth pit in a paltry some of Rs. 2000/- (Including there profit).

No comments! Only GOD can help and save the installation. Life is Uncertain.

B. Chemical Electrode earthing:-

It's a maintenance free earthing and our experience over the past two years on periodically checked by us and other manufacturer's shows constant results with respect to the ohmic values. **Therefore the graphical representation of this type of earthing is straight line with no noticeable change.**

It gives you safe certain and sure protection to the installation.

A CONCLUSION!

Why Chemical Earthing is more DURABLE AND RELIABLE?

3. Cost of maintenance:-

A. COPPER PLATE:-

In the pit type earthing some cost is required as under:

- a) The cost of labour for watering at periodical interval.
- b) The cost of water it is not free every where.
- c) The cost of maintenance of the water pipe going to the pit which gets choked due to scale formation and flow of water will be restricted or blocked.
- d) The cost of charging by putting salt and charcoal which is undesirable and not permitted for safety reason.

B. Chemical Electrode earthing:-

The cost on account of maintenance is zero.

CONCLUSION: - Considering the various aspect of the earthing for electrical safety of the domestic, industrial and commercial establishments, it is concluded on the basis of information answered in the questions generally asked by the project engineers and consultants that the chemical earthing is no doubt has a long life, need no maintenance and meets all the parameters of safe and reliable earthing System.

HOW TO AUDIT EXISTING EARTHING SYSTEMS AND PROVIDE SOLUTIONS

A. Complete Audit of the system:-

1. Testing of the existing earth systems and identifying them as

1.1. satisfactory

1.2. Unsatisfactory

The unsatisfactory system will get rejected and shall be disconnected from the system

2. The identifying the new location for new earthing.

3. The soil for the location of new earthing will be tested for resistivity. The resistivity details as per the general data are given below:

FACT ABOUT SOIL RESISTIVITY - the resistivity of earth may vary over extremely wide limits, depending on the composition of the soil and the moisture content. Representative values are:

| | |
|-----------------|-------------------|
| General average | 100 ohm-meters |
| Swampy ground | 10-100 ohm-meters |
| Sea water | 0.01-1 ohm-meters |
| Dry earth | 1000 ohm-meters |
| Pure slate | 10^7 ohm-meters |
| Sandstone | 10^8 ohm-meters |

After identifying the soil and carrying out the test, the decision will be taken for rectification of the soil. We have to do the artificial treatment of soil by putting chemicals as per clause of

IS: 3043-1987. We shall however prefer to put additional agricultural soil by replacing the last three categories of soil which are found in desert areas.

B. The Selection of Earthing electrodes :-

The earthing electrode would be designed and selected on the basis of expected fault currents in the installation. We shall depend on either on the data provided by you on the impedance of the transformers and KVA rating of the equipment Or we shall assume as a matter of thumb rule an impedance of 5% for the transformers and work out the fault currents in the worst case of phase to neutral or phase to phase faults. E.g. our assumption of fault current for 1000kva transformer is 28 KA.

On the basis of fault current we shall design a system to with stand the following parameters

1. Current Carrying Capacity for the full fault for the duration of the fault so that the ACBs function and trip and disconnect the system from the situation.
2. The appropriate dissipation of heat thus generated for the duration of fault so that the equipment and electrodes are safe.
3. The use of chemicals (proper mixture) i.e. GEMto provide adequate humidity to the earthing electrode to ground the faults without any maintenance and watering of the earth bore.
4. The electrode system designed by us is totally chemical based and not based on use of charcoal and salt and is totally maintenance free.
5. The typical example is of the electrode manufactured by us 80mm x 3mtrs which is tested by CPRI for 7Ka for 1 sec. It means that for worst fault of 40KA for 4 ms approx. it will not generate enough heat to puncture the earthing electrode. Because the ACBs and other protective equipments will trip of earlier on the basis of **inverse time characteristics**.

B. The Selection of Earthing electrodes :-

6. In case of the higher capacity of transformer and substation we generally provide more nos. of earthing in grid may 6,8 or 12 in parallel or in case of need we design special electrode with larger diameter and larger the cross section of strip. **The length of the electrode is limited to maximum three meter which is much below the frost level in Indian climate.**
7. **In absolute rocky or stony areas where we cannot go three meter deep we design an L-shape electrode with the smaller arm of the L will be 600mm minimum. In case 600mm may not be possible in certain mountainous areas then we may go deep as much as possible about 300mm and above and raise the ground by putting additional agricultural soil.**
8. The installation procedure is illustrated in Next Slide.

What is the installation procedure & instructions

Detail Schedule of Installation:-

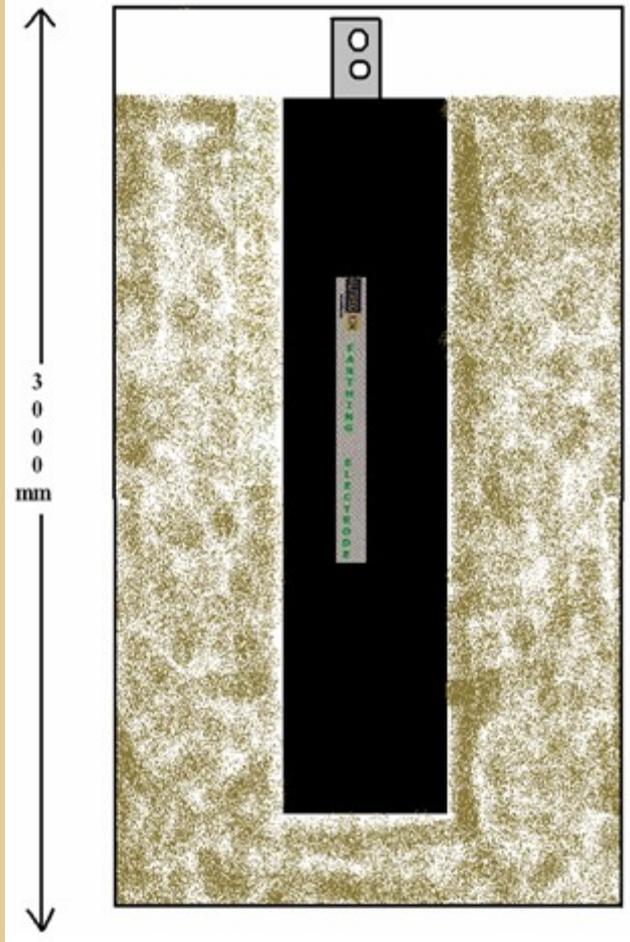
- The Earthing electrode will be installed as per the following schedule of work:
- The location of the site to be decided or identified by the staff of DCW, Patiala (Electrode should never be installed in the proximity to a metal fence).
- The respective boring will take place of appropriate depth of 3 meters and minimum 250 mm Diameter.
- The bore will be watered for 48 hours in case the soil condition is good then watering will be carried out for 24 hours at the discussion of our technical support engineer and staff.
- After the appropriate watering is done and the bore is cleared off mud etc. formed their in the bore then the electrode will be inserted at the centre of the bore.
- The GEM compound which is supplied in the packs of 35Kg. each will be mixed with the water of appropriate quantity to make thick slurry of the compound and pour it around the sides of the electrode gradually to reach upto the ground level. The slurry of the GEM poured in the bore around the electrode will take curing time of seven days to mix up with the soil and attain the natural properties of surrounding soil.

7. The first testing of ohmic values for preliminary result will be carried out on the day of installation and the final results are taken after the seven days of installation.
8. The earthing electrode can be connected after the preliminary test and safety of the equipment can be insured.
9. In certain cases of rocky and stony areas where it is not possible to go 3 meter Deep then the manufacturers recommendation for or to install horizontal electrode of L-shape where the small arm of the L will be of 600mm. In such cases the GEM compound will be 50% more than the vertical installation.

Additional Precautions to be followed:-

- Handle carefully and do not plunge an electrode.
- Do not apply any extraordinary force/pressure during installation.
- Never try to disassemble, repair or otherwise tamper with an Earthing Electrode.
- Do not strike it with hammer or other object and never step on it.
- Avoid prolonged physical contact with any type of metal fence.
- Always use very high standard wire/accessories to connect Earthing Electrode with the equipments.
- Eradicate all packaging material such as plastic cover / bubble paper prior to installation of an Earthing Electrode.

View Of The Earth Pit



SPECIFICATION FOR ALFREDKIM CHEMICAL EARTHING

❑ D. MODEL- AKE0376 (76mm x 3000mm)

1) Type of Earthing:-

Sealed maintenance free chemical filled earthing electrode.

2) Diameter of the pipe:-

76mm

3) Thickness of the pipe:-

3.9mm

4) Length of the pipe:-

3000mm

5) Galvanized Thickness:-

80-100micron

6) Type of galvanizing:-

Hot dipped

7) Size of the conductor:-

40x6 G.I. strip

8) Terminal diameter:-

14mm

9) Chemical used in the pipe:-

CCM Approximate Weight-12 kg



SPECIFICATION FOR ALFREDKIM CHEMICAL EARTHING

□ D. MODEL- AKE0376 (76mm x 3000mm)

10) KIMMOIST(Ground Back Fill Compound) :-

- I) Minimum 70 kg it is soil enrichment chemical mainly consisting Aluminum Silicate.
- II) It absorbs moisture but doesn't get dissolved in water.
- III) It can absorb water 13 times of its weight.
- IV) The top & bottom of the pipe is sealed permanently.

11) Earth fault capacity:-

1250KVA

12) Surface Area:-

715920mm

13) Brand:-

Alfredkim

14) Manufactures:-

ALFREDKIM SYSTEMS & SOLUTIONS PRIVATE LIMITED

14/3, Bolton Compound, Mathura Road, Faridabad-121003, Haryana (India)

www.alfredkim.net

SCOPE OF WORK:-

Our scope of work includes mainly the installing the electrode and making an earth station at the point of location identified by DCW.

The work related to the installing of the electrode including making a bore in the ground is part of the installation of the electrode. The additional work relating to the civil, mechanical or electrical work not directly pertaining to the installation of electrode will be out of our scope of work.

If such work is carried out at your request will subject to mutual consent at a price quoted by the manufacturers and accepted by the department.

The connecting strip from the earth station i.e. the electrode to the point of equipment which will be connected will be charged to you at the rate of per meter length and will be part of contract of supply, installation of the electrode. The department will have to provide us at the enquiry stage the approximate running length of the strip for giving the quote but actual payment will be made by the department by the measurement of the length.

Procedure of laying the connecting strip from earth station to equipment UNDER THE GROUND:-

The G.I. strip of appropriate dimension say e.g. 65mmx8mm shall be laid into a trench on the ground.

The trench will be 250mm deep and about 20mm wide where in the G.I strip will be laid into embedded with the GEMcompound in two or more layers below and the above the strip.

SCOPE OF WORK:-

On the surface of wall or else where:-

The G.I. strip will be carried on the surface of wall with a provision of cleat to provide the gap between the wall and strip.

The laying of the strip includes the labour charges for digging and refilling the trench @ Rs. 100/- per meter length. For laying the strip on the wall or similar surface @ Rs. 75/- per meter which includes supply of cleat and fixing hardware like screws, washers etc.

Cost of the Chemical:-

It will be about 20 kilos per meter length. The chemical will be filled in the trench in two layers in form of slurry under neath the strip and above the strip. The chemical will be Rs. 32/- per kilos .

Earth Pit Cover:-

The earthing electrode will be supplied with Cast Iron (C.I.) cover (similar to manhole cover) this will include the masonry work related to the small brick work which will be carried out by us. The Cast Iron cover will be supplied @1500.00

Thanking You

NEW PPRODUCT-

Lightning-protection system

- A **lightning protection system** is a system designed to protect a structure from damage due to lightning strikes by intercepting such strikes and safely passing their extremely high voltage currents to "ground". Most lightning protection systems include a network of lightning rods, metal conductors, and ground electrodes designed to provide a low resistance path to ground for potential strikes.

Lightning arrester?



lightning arrester is a device used on electrical power systems to protect the insulation on the system from the damaging effect of lightning

When a lightning surge or switching surge travels down the power system to the arrester, the current from the surge is diverted around the protected insulation in most cases to earth

Who Are Our Important Customer?

Faridabad:-

1. *Pyramid Control System pvt Ltd*
14/4, Mathura Road, Faridabad
2. *Havells India Pvt Ltd*
14/3, Mathura road, Faridabad
3. *SRS TOWER*
Sec-31, faridabad
4. *Siya Ram Engineers*
Shed No. 150 Type-A, HSIIDC Sec-31, Faridabad
5. *Joneja Bright Steel Pvt Ltd*
Plot No.239&244, sec-24, Faridabad
6. *Vijay Engineering & Metal Works*
Plot no.165/66, Sec-24, Faridabad
7. *Swastika Automatics*
S.G.M Nagar, Faridabad
8. *Asha Telecom Pvt ltd*
17/3, Mathura Road, Faridabad
9. *Prime Electronics*
14/3, Mathura Road, Faridabad
10. *Fine Turn*
240, Sector -24, Faridabad
11. *S. R. Engineers*
A-150 Sector-31, Faridabad
12. *Saraswati Sishu School*
Tegoan, Ballabgarh, Faridabad
13. *Dev tech Printers*
14/3 Mathura Road, Faridabad
14. *Iskan India,*
Gandhi Colony, Railway Road, Faridabad
15. *SPCP Industries,*
A-50, 16/5, Mathura Road,
Kakhanabag, Faridabad
16. *Malhotra Shaving Products Pvt Ltd*
Factory-23/7, Sec-59, Ballabgarh, Faridabad-121004
17. *Lakhani Vardan Group (LVG)*
Plot No.131, Sec-24, Ballabgarh, Faridabad

Who Are Our Important Customer?

18. Krishna Gravure Private Limited

13/7, Inside G.D. Industries, Mathura Road,
Faridabad-121003, Haryana

19. Super Lamnicote Private Limited

13/7, G.D. Industrial Engineers Compound,
Mathura Road, Faridabad-121003

20. Heena Off-set Printers

Plot No.44, Sec-58, Ballabgarh, Faridabad

21. S.P. Industries

Plot No.80, Sec-25, Ballabgarh, Faridabad

22. Residential Earthing

House No.2042, Housing Board, Sector-3, Ballabgarh

23. Reliance Fabricators and Engineers

9, DLF Industrial Area, Phase-I Faridabad

24. Haryana Texprints Overseas Limited

Plot No.-3, Sector-25, Ballabgarh, Faridabad

25. The YMCA Institute of Engineering

Sector-6, Mathura Road, Faridabad

26. Varun Precision Components Pvt. Ltd.

Shed No. 216-B, 220-D, HSIDC, IE, Sec-59, Faridabad

27. *Plasser India Pvt. Ltd.*

th

*13 Mile stone Mathura Road,
Gurukul Indraprastha Estate, Faridabad*

28. ARS Rotoprints

Shed No. 3, Subhadra Estate,
RSPL Compound, Sec-58, Ballabgarh, Faridabad

29. ARVIND Industrial Product Corporation

A-2.Neelam-Bata Road, Nehru Ground, Faridabad

30. AVERY India Limited

50-59, Sec-25, Ballabgarh (Faridabad)

Gurgaon:-

1. Nutek India Limited

(AIRCEL Tower, Baljeet Nagar, Delhi)
B-27, Sector-34, Info city, Gurgaon

Sonepat:-

LT Foods Limited (Daawat Basmati Rice)
Sonepat, Haryana

Who Are Our Important Customer?

DELHI

1. *Tata Power SED*
Kasturba Gandhi marg, New Delhi
2. *Control & Switchgear Private Limited*
(For Installation at South Block)
222, Okhla Industrial area, Phase-III, NewDelhi-110020
3. *Mother dairy Plant*
Patparganj, Delhi
4. *ADEP BIO-TEC Industry Limited*
29/15, Village-Pindwala, Khurd, Najafgarh Road,
New Delhi
5. *Residential Earthing*
House No.1, Mini Farm, Vasant Kunj, New Delhi

UTTAR PARDESH

Noida:-

1. *Castrol Zone*
A-14 Sector 58, Noida
2. *Keizer Pvt ltd*
D-328, Sector 63, Noida

3. *U Flex Industries Ltd*
Plot No. -1 sector 60, Noida
4. *Daltronics India Ltd.*
A-88 Sec 57, Noida
5. *Daltronics India Ltd.*
E-3, Sec-59, Noida
6. *Supertech Diesel Power Engineers*
C-89, Sector-44, Noida-201301

Ghaziabad:-

1. *SiddhoMal paper Conversion Pvt. Ltd.*
20 Loni roads Industrial Area, Mohan Nagar, Ghaziabad
2. *Spark Engineering P Ltd.*
40/1, Site IV, Sahibabad industrial Area, Ghaziabad
3. *Castrol Zone*
Site IV, Sahibabad
4. *Coca Cola Factory*
Site-IV, Sahibabad industrial Area, Ghaziabad

RAJASTHAN

1. *Daikin Air-Conditioning (India) Pvt, Ltd*
Sp-2/12, To Sp-2/15 & Sp-2/24 to Sp-2/27,
RIICO New Industrial Complex (Nimrana) D
Distt- Alwar, Rajasthan
2. *CAIRN INDIA LTD.*
BARMER, RAJESTHAN

WHAT ARE DO's and DON'Ts - GENERAL PRECAUTIONS

Do's

1. Engage Licensed / Government approved wireman / electricians for all repairs / maintenance of electrical wiring, plugs, switch boards.
 2. Carry out all electricals works after switching off the electrical supply.
 3. Change immediately old and damaged wiring where insulation has been damaged.
 4. Avoid joints in the wiring. All necessary joints should have proper taps / insulation.
 5. Loose wiring results in sparking. Ensure that wires are tightened at both ends.
 6. All on / off switches of electrical appliances should have easy access. Remove obstructions if any in their way.
 7. Select appropriate size of fuse wire / MCB's for main fuse and circuit fuse.
 8. In case of fire from electrical circuits, switch off the supply immediately and use sand, carbon dioxide or dry powder extinguishers. Do not use water.
 9. Effective earthing should be provided to all electrical appliances. Install Earth Leakage Circuit Breakers on the electric line will prevent shocks. Earthing should not be done on water / steam pipes / iron rods of the slab.
 10. Insall an indicator light for an electric heater and an auto temperature control switch.
 11. Use properly earthed 3 pin plugs for all electrical appliances. Electrical appliances should be kept away from damp and hot surface and from flammable goods. Dim or flickering lights, sparks, buzzing sound from electrical appliances are signs of potential hazards, contact qualified electrician immediately.
 12. Insall a switches and plugs at a heights out of reach of children.
 13. Use rubber mats near fridge, heater, electric cooking range etc.
-
1. Main switchboard and meter should be safe and protected from rain, wind dust. Meter Box should preferably be wooden and at height of 1.5 meters.
 2. keep away from overhead lines and do not touch broken wires.
1. Don turn off appliances when you leave home.
 2. Do wear rubber soled shoes when operating power tools.
1. Outdoor electrical outlets should be covered with weatherproof covers.

Don'ts **X**

WHAT ARE DO's and DON'Ts - GENERAL PRECAUTIONS

1. Don't go near to any place where 'danger' caution board is placed.
 2. Don't tamper with electric meter, tampering may land you in jail.
 3. Don't use broken fittings; replace broken switches / fittings immediately.
 4. Don't use metallic wire near electric lines for hanging wet clothes.
 5. Don't carry out construction in proximity of electric lines.
 6. Don't touch switches / plugs with wet hands.
 7. Don't dry clothes on electric wires.
 8. Don't insert more than one plug in socket. While removing pin from plug socket, pull the plug top and not the wire.
 9. Don't overload outlets.
 10. Don't ignore flickering lights, blown fuses or sparks.
 11. Don't use older extension cords without inspecting them first.
 12. Don't assume that your house is wired safely.
 13. Don't ignore switches or outlets that don't work.
 14. Don't use electrical appliance or talk on the phone during an electric storm.
 15. Don't mix water and electricity.
 16. Don't insert wire directly into the plug socket without a matching plug pin to use any electrical appliances even on temporary basis.
 17. Don't touch a bare wire i.e. without insulation, it may be live.
 18. Don't make any temporary joints in the wiring without proper insulation.
 19. Don't provide fuse on neutral circuit.
 20. Don't use any appliance, heater, electric iron, cooler without proper earthing.
 21. Don't provide higher size fuse wire than the prescribed size.
 22. Don't use wet hand to switch On and switch OFF the electricity.
 23. Don't disconnect a plug by pulling the wires when switch is ON.
 24. Don't switch On, the socket switch unless the plug is completely inserted.
1. Don't connect earthing wire with water taps, this may be hazardous.
 2. Don't use water on the electrical equipment, to extinguish the fire, switch OFF the supply.
 3. Don't allow children to play with sockets, plug, wire and other electrical appliances.



Do's

1. Stay away from windows and doors, and stay off porches.
2. Avoid contact with anything that conducts electricity.
3. Stay away from metal objects.
4. Avoid contact with corded phones.
5. Avoid contact with plumbing. Do not wash your hands, do not take a shower, do not wash dishes, and do not do laundry.
6. Stay away from tall, isolated objects
7. Know the weather patterns of the area. For example, in mountainous areas, thunderstorms typically develop in the early afternoon, so plan to hike early in the day and be down the mountain by noon.
8. Know the weather forecast and plan your day accordingly.
9. Outdoor activities should be avoided before, during, and after storms.



Don'ts

1. Don't lie on concrete floors and do not lean against concrete walls.
2. Don't seek shelter under tall isolated trees.
3. Don't seek shelter under partially enclosed buildings.
4. Don't place your campsite in an open field on the top of a hill or on a ridge top. Keep your site away from tall isolated trees or other tall objects. If you are camping in an open area, set up camp in a valley, ravine, or other low area.
5. Wet ropes can make excellent conductors. This is BAD news when it comes to lightning activity. Remove unnecessary ropes extended or attached to you. If a rope is extended across a mountain face and lightning makes contact with it, the electrical current will likely travel along the rope, especially if it is wet.



Do's

1. Any abnormal noise / spark or smoke noticed in the machinery / equipments should be attended immediately
2. Always keep the fuse box, main switch, control box, panel etc. properly locked and without obstacles
3. Electric equipments / wires to be used near highly inflammable chemicals should be of ISI mark and flameproof and proper earthing to these should be ensured
4. Strictly adhere to all electrical rules and regulations
5. Please provide proper size of wiring for each machinery to avoid voltage drop and insulation melting
6. Use armoured cable for motor winding
7. Provide proper earthing for the installations and motor casings



Don'ts

1. Do not touch any electric switch with wet hands or while standing on wet / damp ground or wet electric equipments / installations
2. Do not touch wires where insulation has worn out
3. Do not touch a person receiving electric shocks. Switch off the supply and then remove him either with cloth, paper or wood. Keep the person warm and give him artificial respiration and immediately consult a doctor



Do's

1. Electric supply should not be given from one Distribution Board to another
2. After completing electric wiring, insulation resistance should be measured with the help of ~~megger~~ and reported in the Test Report
3. Electric supply should not be connected till satisfactory Testing results are achieved
4. All switches should be connected to circuit phase wire
5. Select appropriate size of cables, wires or flexible wires
6. Use wires compatible with the equipment rating, however, not less 4 mm²
7. Insulation should be provided between live wires and wires used for electrical appliances



Don'ts

1. Do not wear metallic belts, chain, buttons, ornaments or keep metallic tools, knife etc. in your pockets
2. Do not touch electric pole, climb the tower or try to remove foreign objects from overhead lines
3. Do not paste / attach advertisement boards, banners, TV channel wires, etc. to electric poles / street pillars
4. For temporary connections, always use appropriate and continuous wires. Do not allow the wires lying on the floor. Place them at a suitable safe height



Do's

1. Keep away from outdoor areas marked with signs that say "Danger" or "Danger High Voltage."
2. Look up for hydro wires running through or beside trees before you climb.
3. Stay clear of overhead power lines and wires.
4. Respect utility electrical equipment.
5. Fly kites, balloons and model airplanes in wide-open spaces, away from power lines.
6. Always try to get inside a building or a car during a lightning storm.



Don'ts

1. Don't play near electrical stations, equipment, wires, hydro towers or utility poles.
2. Don't climb or play in trees where there are overhead wires nearby.
3. Don't throw anything at wires or electrical equipment, and don't fasten things to utility poles. Damaged equipment can be very dangerous.
4. Don't throw anything at wires or electrical equipment, and don't fasten things to utility poles. Damaged equipment can be very dangerous.



7. When disconnecting appliances from electrical outlets, use the plug when you pull it out.
 8. Remind your parents to replace electrical cords that have cut, broken or cracked insulation.
 9. Keep electrical cords away from sources of heat.
 10. Keep electrical cords and appliances away from water. Plug cords into GFCI protected outlets when you're working near a sink or other water source.
 11. When you're changing a light bulb, be sure to turn off the switch or circuit.
 12. Put safety caps on any unused electrical outlets, especially if there are young children in the house.
 13. If there's an electrical fire, call the fire department. Use a dry chemical fire extinguisher or baking soda to douse an electrical fire. If it's safe to do so, unplug the appliance first.
 14. Call your local emergency number if you see a person who is receiving an electrical shock and is seized on an appliance or a wire.
5. Don't fly kites or other toys near overhead power lines or substations. A string or line that contacts electrical equipment or a power line can cause a shock that could kill you.
 6. Don't stay outside when there's lightning. Avoid wide open spaces and tall trees. If you're swimming, get out of the water.
 7. Don't pull on the cord when you unplug an electrical appliance. Use the plug.
 8. Don't use appliances that have damaged electrical cords — there's a risk of shock.
 9. Don't run cords under carpets.
 10. Don't mix water and electricity. If an electrical cord or appliance is faulty, water will conduct the electricity and increase the risk of shock.
 11. Don't work on light fixtures or appliances without unplugging them or switching off the power. Never put your finger in a light bulb socket.
 12. Don't poke anything into an electrical outlet.
 13. Don't use water to put out an electrical fire.
 14. Don't touch someone that is being shocked until the electricity has been turned off.



Entering the Home after FLOOD.

WHAT ARE DO's and DON'Ts - GENERAL PRECAUTIONS



Do's

1. Turn off the power in your home as soon as it is safe to enter, even if the utility has turned power off in your neighborhood.
2. Turn all electricity off at the main breaker box or fuse box.
3. Use a dry wooden stick to switch off the main breaker, if necessary, instead of stepping in water to reach the electrical box.
4. Shut off the gas by turning the handle of the gas valve perpendicular to the pipe. If the valve handle is parallel to the pipe, the gas is on.



Don'ts

1. Don't step in water when turning off the electricity in your home. Instead, use a dry wooden stick to switch off the main breaker, if necessary.
2. Don't ignore the importance of turning off power in your home, regardless of whether the utility company has turned it off in your neighborhood. The utility company may restore power without warning.
3. Don't try to pick up or clean everything until the more important things are taken care of.



Entering the Home after FLOOD.

WHAT ARE DO's and DON'Ts - GENERAL PRECAUTIONS



Do's

1. Turn off the power in your home as soon as it is safe to enter, even if the utility has turned power off in your neighborhood.
2. Turn all electricity off at the main breaker box or fuse box.
3. Use a dry wooden stick to switch off the main breaker, if necessary, instead of stepping in water to reach the electrical box.
4. Shut off the gas by turning the handle of the gas valve perpendicular to the pipe. If the valve handle is parallel to the pipe, the gas is on.



Don'ts

1. Don't step in water when turning off the electricity in your home. Instead, use a dry wooden stick to switch off the main breaker, if necessary.
2. Don't ignore the importance of turning off power in your home, regardless of whether the utility company has turned it off in your neighborhood. The utility company may restore power without warning.
3. Don't try to pick up or clean everything until the more important things are taken care of.



Entering the Home after FLOOD.

WHAT ARE DO's and DON'Ts - GENERAL PRECAUTIONS



Do's

5. Leave the premises immediately if you smell gas.
6. Check for broken or leaking water pipes. If you find any, turn off the water supply at the main. If your pipes don't appear to be leaking or broken, you can use tap water for hosing and some cleaning, but not for drinking, cooking, or washing dishes or clothes until you're sure it's safe.
7. Find and protect valuable items, such as money, important papers, jewelry, photographs, and family heirlooms. Wash the mud off these items before they dry, if possible. Move them to another location to safe-keeping.
8. Step carefully as water and mud can make floors very slippery. Also watch out for loose flooring and ceilings that are sagging, as well as for snakes and animals.



Don'ts

1. Don't step in water when turning off the electricity in your home. Instead, use a dry wooden stick to switch off the main breaker, if necessary.
2. Don't ignore the importance of turning off power in your home, regardless of whether the utility company has turned it off in your neighborhood.
The utility company may restore power without warning.
3. Don't try to pick up or clean everything until the more important things are taken care of.

CHEMICAL EARTHING

ALFRED KIM

www.alfredkim.net

THANK-YOU

Delivering your vision,
Empowering your
electrical safety

Anil Kumar
Director

Alfredkim Systems & Solutions Pvt. Ltd.
14/3, Bolton Compound, Mathura Road,
Faridabad-121003(Haryana) India
Tel: +91-129-4158603
+91 9810531603
<http://www.alfredkim.net>

