

# EED&D - I

BKN GOVERNMENT POLYTECHNIC NARNAUL  
ELECTRICAL ENGG. DEPARTMENT

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*EARTHING*  
*EARTHING*

# Content of topic

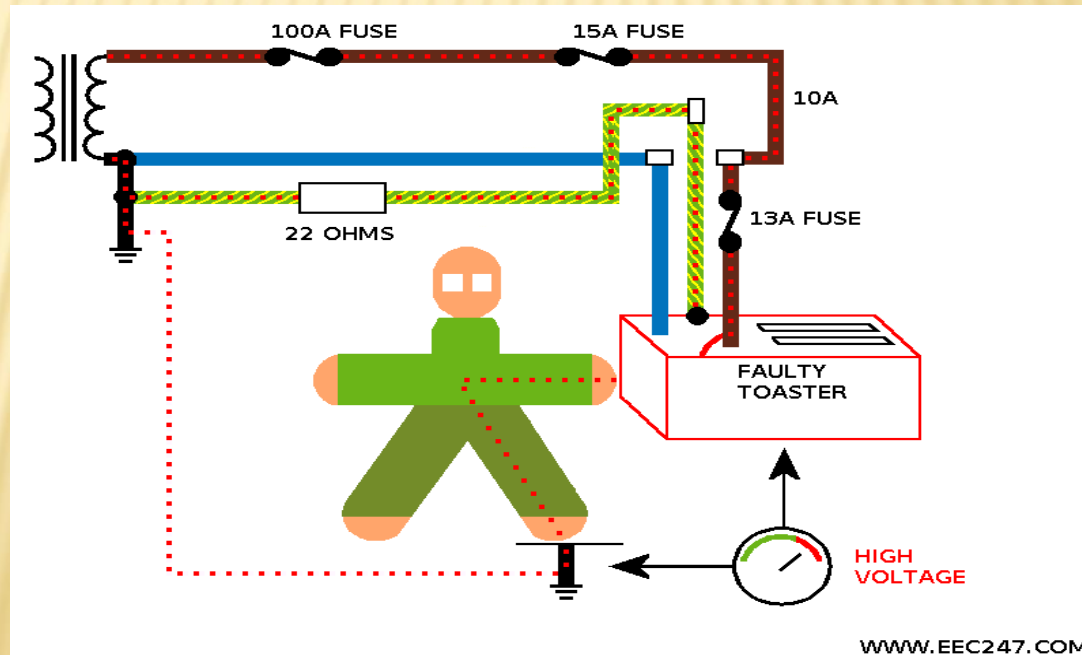
- ▶ **Concept of Earthing Systems**
- ▶ **What Is Earthing ?**
- ▶ **Purpose of Earthing**
- ▶ **Methods of Earthing**

# Concept of Earthing Systems

All the people living or working in residential, commercial and industrial installations, particularly the operators and personnel who are in close operation and contact with electrical systems and machineries, should essentially be protected against possible electrification. **To achieve this protection, earthing system of an installation is defined, designed and installed according to the standard requirements..**

# WHAT IS EARTHING

The process of connecting metallic bodies of all the electrical apparatus and equipment to huge mass of earth by a wire having negligible resistance is called Earthing.

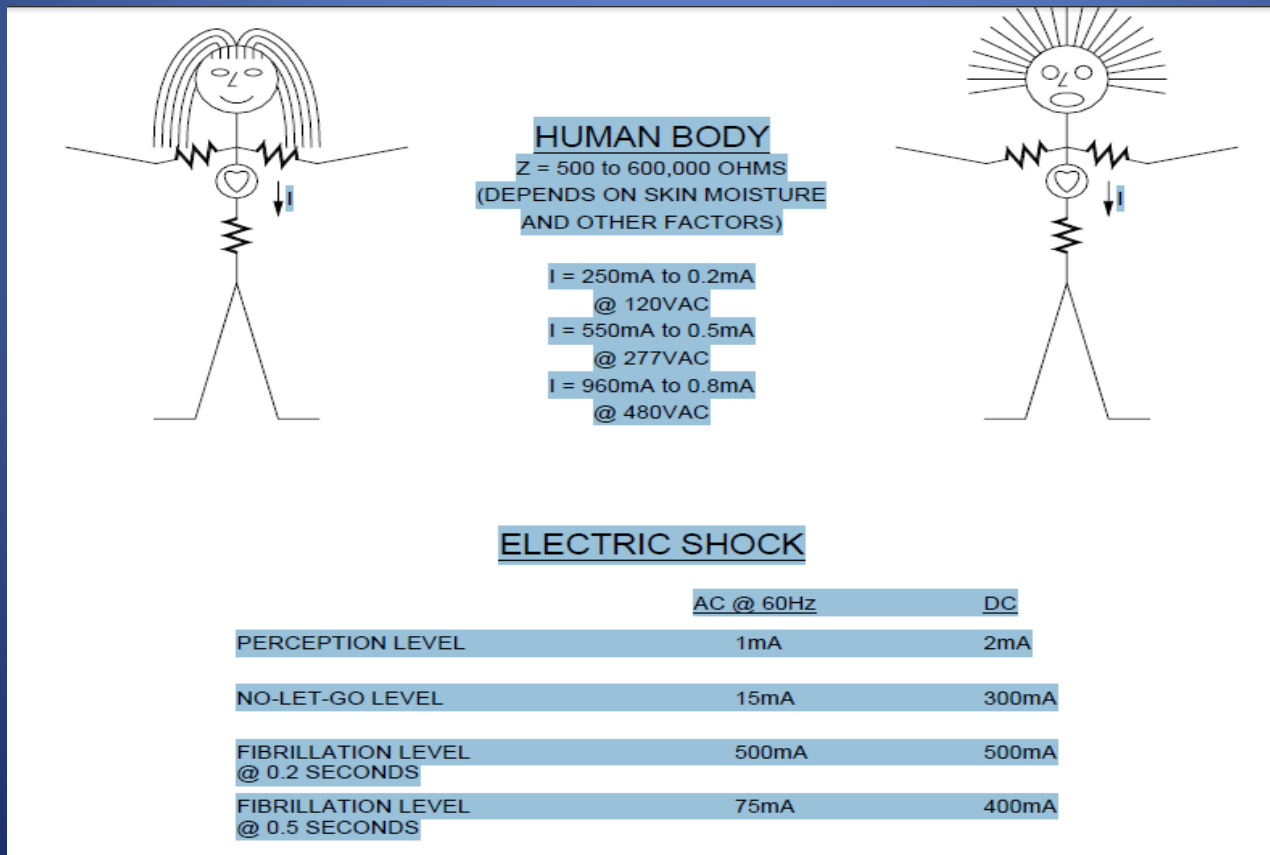


# Purpose of Earthing

- To save human life from danger of **electrical shock** or death by blowing a fuse i.e. To provide an alternative path for the fault current to flow so that it will not endanger the user
- To protect buildings, machinery & appliances under fault conditions i.e. To ensure that all exposed conductive parts do not reach a dangerous potential.
- To provide safe path to dissipate lightning and short circuit currents.
- To provide stable platform for operation of sensitive electronic equipments i.e. To maintain the voltage at any part of an electrical system at a known value so as to prevent over current or excessive voltage on the appliances or equipment .
- To provide protection against static electricity from friction

# Electric shock

- When a high voltage such as 13,800V is involved the body is literally cooked and at times explodes



# Methods of Earthing

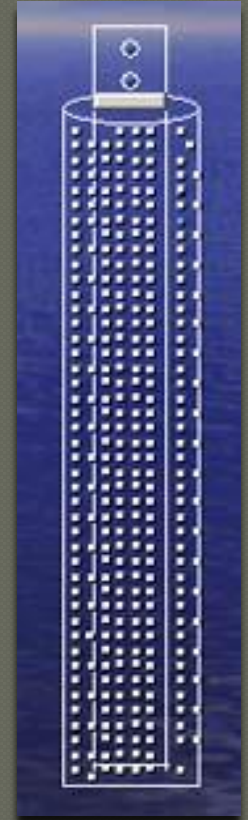
Plate Earthing

Pipe Earthing

Rod Earthing

Strip Earthing

Earthing through  
Water Mains



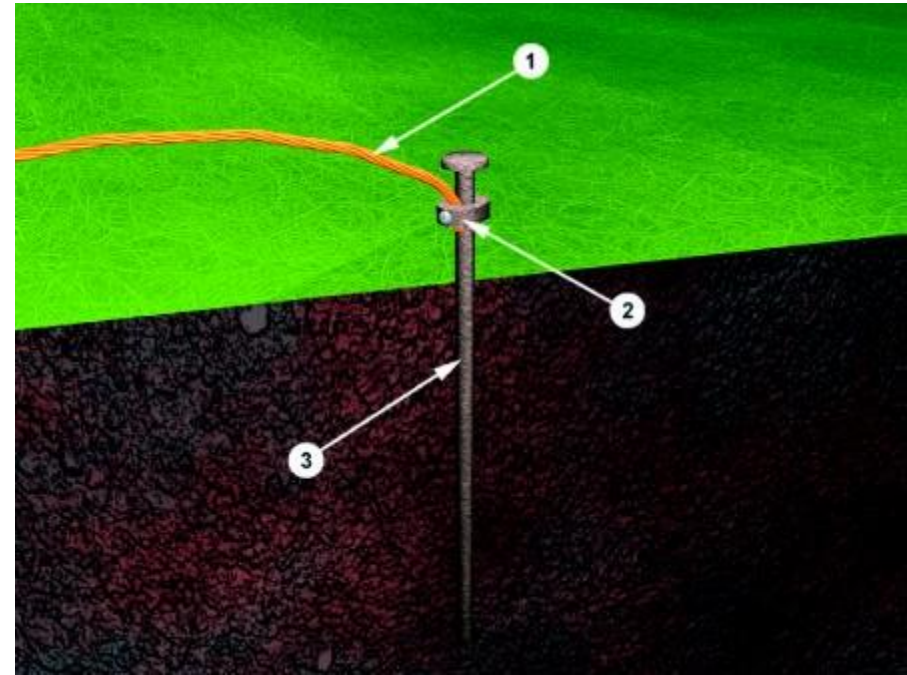
# Earthing Electrode

**The resistance of a ground electrode has 3 basic components:**

- A) The resistance of the ground electrode itself and the connections to the electrode.
- B) The contact resistance of the surrounding earth to the electrode.
- C) The resistance of the surrounding body of earth around the ground

Electrode. It consist of three basic components:

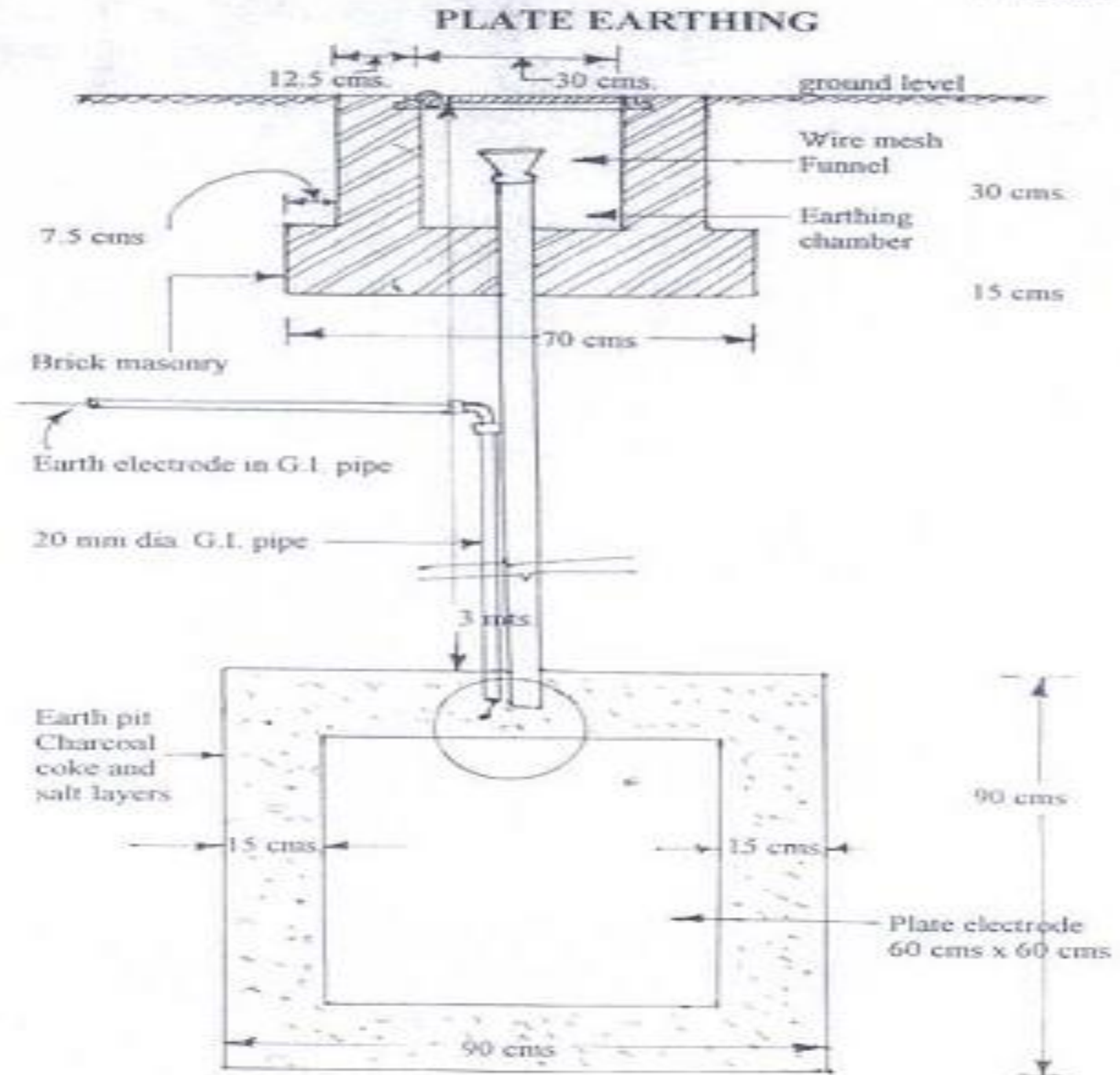
- 1. Earth Wire
- 2. Connector
- 3. Electrode



# (1) Plate Earthing

- In this type of earthing plate either of copper or of G.I. is buried into the ground at a depth of not less than 3 meter from the ground level.
- The earth plate is embedded in alternative layer of coke and salts for a minimum thickness of about 15cm.
- The earth wire(copper wire for copper plate earthing and G.I. wire for G.I. plate earthing) is securely bolted to an earth plate with the help of bolt nut and washer made of copper, in case of copper plate earthing and of G.I. in case of G.I. plate earthing.

# PLATE EARTHING

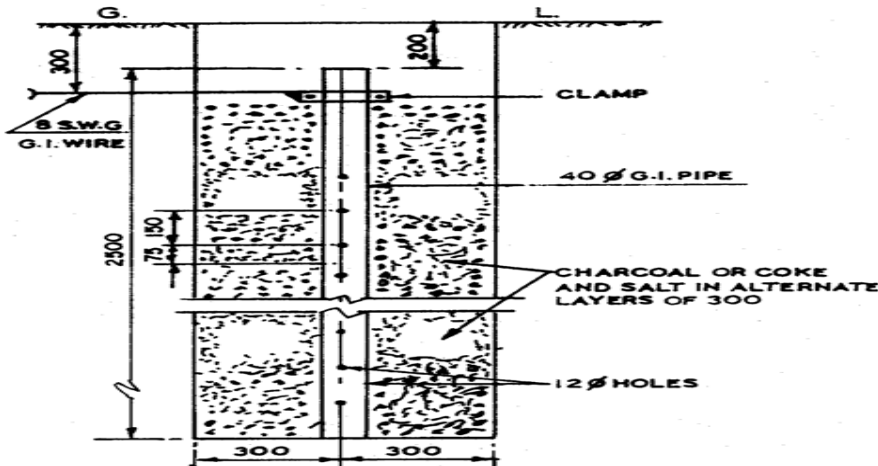


## (2) Pipe earthing

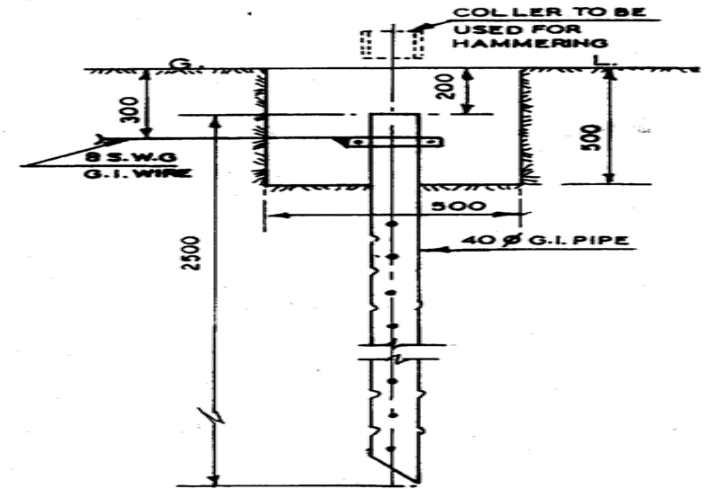
- Pipe earthing is best form of earthing and it is cheap also in this system of earthing a GI pipe of 38 mm dia and 2 meters length is embedded vertically in ground to work as earth electrode but the depth depend upon the soil conditions, there is no hard and fast rule for this.
- But the wire is embedded upto the wet soil.
- The earth wire are fastened to the top section of the pipe with nut and bolts.
- The pit area around the GI pipe filled with salt and coal mixture for improving the soil conditions and efficiency of the earthing system.
- It can take heavy leakage current for the same electrode size in comparison to plate earthing.
- The earth wire connection with GI pipes being above the ground level can be checked for carrying out continuity test as and when desired, while in plate earthing it is difficult.
- In summer season to have an effective earthing three or four bucket of water is put through the funnel for better continuity of earthing.

# PIPE EARTHING

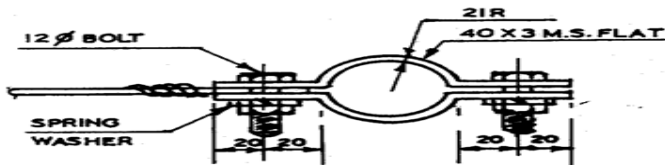
## CONSTRUCTION STANDARD



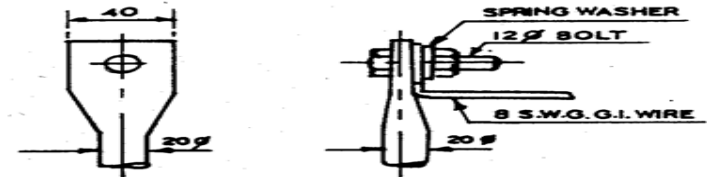
**EARTHING FOR HARD, STIFF OR MEDIUM CLAY**



**EARTHING FOR ORDINARY SOIL WHERE PIPE COULD BE HAMMERED IN**



**TYPICAL DETAIL OF CLAMP FOR PIPE EARTH**



**TYPICAL DETAIL OF CONNECTION FOR ROD EARTH**

### NOTES:-

1. ALTERNATIVELY 20  $\phi$  G.I. ROD MAY BE USED INSTEAD OF PIPE.
2. WATER TO BE POURED INTO SUMP TO KEEP THE SOIL SURROUNDING THE EARTH PIPE / ROD MOIST.
3. FOR COIL EARTHING REFER CONSTRUCTION STANDARD. J-1.

ALL DIMENSIONS ARE IN mm.

PIPE / ROD EARTHING

SCALE :- N.T.S

SEPT. - 1972

## (3) ROD EARTHING

- In this system of earthing 12.5mm diameter solid rods of copper 16mm diameter solid rod of GI or steel or hollow section of 25mm GI pipe of length not less than 3 meters are driven vertically into the earth
- In order to increase the embeded length of electroed under the ground, which is some time necessary to reduce the earth resistance to desired value more than one rod section are hammered one above the other.
- This system of earthing is suitable for area which are sandy in character .
- This system of earthing is very cheap



## (4) STRIP OR WIRE EARTHING

- In this system of earthing strip electrode of cross section not less than 25mm into 1.6mm of copper or 25mm \* 4mm of GI or steel are buried in horizontal trenches of minimum depth of 0.5m
- If round conductor are used their cross sectional area shall not be smaller than three if copper is used and 6mm<sup>2</sup> if GI or steel is used.
- The length of buried conductor shall be sufficient to give the required earth resistance (about 0.5Ω to 1.5Ω)
- It shall however be not less than 15 m
- The electrode shall be as widely distributed as possible in a single straight or circular trenches radiating from a point
- This type of earthing is used in rocky soil earth bed because at such places excavation work for plate earthing is difficult

THANK YOU

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