

Earthing, Bonding, Lightning and Surge Protection Of Electrical Systems and Equipment Training

Description

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Course Description

Earthling is an integral part of any electrical system. Properly selected earthing equipment will accomplish many desirable objectives, such as:

- Improving the system operating characteristics.
- Providing a source of earth fault current relaying.
- Reducing personnel hazards.

Equipment earthing should be differentiated from system earthing since the functions of the two are often confused. A “system earth” is a connection to ground from one of the current carrying conductors of a distribution or wiring system.

The return conductor for a line-to-neutral load on either single or multi phase systems is an example of such a current carrying conductor. This system ground may be made at such locations as transformer or generator neutral points by either a solid connection or through a current limiting device.

The primary purpose of the system earthing is related to operational characteristics and is an important, if not an essential part of the power system. This 5 days course will discuss the different types of earthing systems in depth.

Course Objectives

- The basic principles & importance of earthing of electrical systems.
- The function of power system earthing and the various options available.
- Role of protective grounding in ensuring safety; sizing of grounding conductors.
- Importance of equipotential bonding in ensuring safety.
- Design of ground electrodes, measurement of soil resistivity and ground electrode resistance.
- Fundamental principles in the design of grounding systems in substations.
- Solving static electricity-related hazards by grounding and bonding.

- Role of grounding in surge protection of power distribution equipment and sensitive systems.
- How to test and maintain earth electrode & Earthing grid

Course Outlines

Day One:

- What is System Earthing.
- Why Use System Earthing.
- Basics of grounding/earthing & Bonding.
- Objectives of equipotential bonding.
- Different types of functional & Protective earthing.
- Electricity shock & hazards & Equipment earthing
- Static charges and the need for bonding.

Day Two: Different Types of System or Neutral Earthing.

- Systems with an isolated neutral-point.
- Reactance earthed systems.
- Resistance earthed systems.
- Earthed system:
- Effectively earthed system.
- Not effectively earthed system.
- Zigzag earthing transformer.
- Sizing of Earthing resistors & Zigzag transformers.
- To Choose System's Earthing Point.
- Practice of Earthing.
- Comparison of Different system Earthing Principles
- Earthing & Earth fault protection.
- Different earhing of distribution system arrangements (TT, TN-C, TN-S & IT) as per BS 7671 & IEC 60364.

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Day Three:

- Static electricity and protection.
- Lightning & surge arresters.
- Transient overvoltages.
- PQ problems & triplen harmonics (Zero phase sequence).
- Ground electrode system.

Day Four:

- Substation earthing grid.
- Touch & Step voltages.
- Grounding regulations from various national codes.
- BS 7430 & IEEE 80 Standards.
- Maintenance & testing (3 pin method, 61.8% and slope method).
- Finite Element Method (FEM).

Day Five:

- Methods of designing Grounding systems.
- Ground faults.
- Design cases (Grounding module) & Reporting.

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