Training Program:

Earthing, Bonding, Lightning & Surge Protection

Introduction:

Poor earthing practice can be the cause of continual and intermittent difficult-to-diagnose problems in a facility. This course looks at these issues from a fresh yet practical perspective and enables you to reduce expensive down time on your plant and equipment to a minimum by correct application of these principles.

This course is designed to explore the subject of earthing and presents the subject in a clear, straightforward manner. Installation, testing and inspection procedures for industrial and commercial power systems will be examined in detail.

Essentially this course is broken down into earthing, shielding and surge protection for both power and electronics systems. Earthing and surge protection for telecommunications and IT systems are examined in detail. Finally, the impact of lightning is examined and simple techniques for minimizing its impact described.

Who Should Attend?

Electrical and instrumentation technicians, electrical contractors, electrical engineers, electrical inspectors, electricians, instrumentation and control engineers, building service designers, consulting engineers, data systems planners and managers, maintenance engineers, power system protection and control engineers, project engineers, safety professionals

Course Objectives:

By the end of this course delegates will be able to:

- Learn how to protect yourself and others from electrical hazards
- Identify electrical hazards when doing maintenance work
- Learn about best practice in electrical design for safety
- Identify key electrical safety parameters
- Apply electrical safety to hazardous areas
- Learn about UK Standards that apply to electrical safety
- Learn the key procedures in safe electrical working
- Learn about regular periodic inspection and planned maintenance for safe operation of electrical equipment
- Learn how to conduct an electrical safety audit and ensure your plant is in compliance
- Learn how to report accidents, carry out investigations and determine measures to improve safety

Accreditation:

BTS attendance certificate will be issued to all attendees completing a minimum of 80% of the total course duration.

Course Outline

Earthing Basics

- Basics of earthing, Bonding , Lightning and surge protection
- Static charges, Shielding, UPS systems and their earthing practice

Earthing of Power System Neutral

- Unearthed and solidly earthed systems
- Impedance earther systems, Resonant impedance earth systems

Equipment Earthing

- Shock hazards to the human body, Earthing of equipment
- Operation of protective devices, Thermal capacity of earthing wires
- Touch potential, Induced voltages
- Multiple earthing connections, Surge protection earthing

Lightning and Its Effect on Buildings and Electrical Systems

- The incidence and probability of lightning strike
- Methods of lightning protection, Planning for lightning protection
- Improvements to lightning protection, Effects of lightning strike on overhead lines
- To protect or not to protect

Static Electricity and Protection

- What is static? Generation of charge, Common examples
- Energy of a spark, Ignition capability of a spark
- Dangers of static buildup, Control of static
- Assessment of risks and planning

Earth Electrode Systems

- Earthing electrodes, Soil resistance, Measuring soil resistivity
- Resistance of single rod electrodes, Current carrying capacity of an electrode
- Measurement electrode resistance single and multiple rods
- Concrete encased electrodes, Corrosion of electrode systems
- Maintenance of electrode systems, Chemical electrodes

Surge Protection of Electronic Equipment

- What is a surge? Bonding of different earthing systems
- Surges and surge protection, Principles of surge protection
- Achieving graded surge protection, Positioning and selecting surge protection

Electrical Noise and Mitigation

- Definitions of electric noise, Analysis and categories of noise
- Electrostatic coupling, Electromagnetic coupling
- Shielded isolation transformer, Insulated earth receptacle
- Zero signal reference grid, Harmonics

Ups Systems and Their Earthing Practices

- Power quality issues, Abnormal voltage conditions
- Susceptibility and measures to handle voltage abnormalities
- Regulating transformers, Standby sources
- Electro-mechanical UPSs, Solid state UPSs
- Multiple redundant systems, Selection of a UPS