



**Training Program:**

**Industrial Electrical Safety Techniques**

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## Introduction:

A number of serious accidents and fatalities occur every year in the industry due to accidents involving electricity, taking a huge financial and human toll. The dangers and risks from electrocution, shock, explosions and arc blast can never be eliminated but you can take definite steps to protect yourself and your co-workers. Safety should be built into the design of electrical equipment and followed up with proper installation, operation, maintenance and periodic inspection. Electrical safety is not just a technical issue. Accidents can only be prevented if appropriate safety procedures are developed and enforced. This includes complete familiarity with equipment and systems often imparted through structured training to each and every person who operates or maintains the equipment. In this course, we will take a look at the theoretical aspects of safety as well as the practical issues including the statutory and safety-training related aspects. This course will certainly enable the candidates to deploy appropriate safety procedures in their workplace and improve their safety record.

## Who Should Attend?

Electrical engineers, electrical, mechanical and instrumentation technicians, instrumentation and control engineers, maintenance technicians and engineers, mechanical engineers, power system protection and control engineers, building service designers, consulting engineers, data systems planners and managers, project engineers, anyone working within an industrial environment will benefit from this training, all staff that may enter, pass by or have any direct or indirect contact with electrical infrastructure

## 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
- Gain knowledge on the 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
- Conduct an electrical safety audit and ensure your plant is in compliance
- Report accidents, carry out investigations and determine measures to improve safety

## Course Outline

### **Principles of Safety Rules**

- Electrical hazards
- Requirements for safety
- Operative training
- Personnel levels of competency
- Safety documentation

## Electrical Shock and Methods of Shock Prevention

- Shock " direct and indirect contact
- Touch and step potential
- Effects of shock on the human body
- The deadly combination of heights and electric shock
- Locations of increased shock risk
- Principles of shock protection
- First-aid for burns and electric shock
- Earth leakage circuit breakers
- Role of electrical insulation in safety

## Hazards Due to Electrical Arcing and Heating

- Arc flash definition, Arc blast
- Hazards due to arcing/flashover
- Effects of arc flash on humans
- Physiological effects, Tissue damage
- Internal organ damage, Burns, Fibrillation
- Arc blast pressure, sound pressure
- Reducing arc-flash hazards
- Minimize risk with good safety practical
- Consideration for new equipment
- Reduce the available fault current

- Increasing worker distance, Faster tripping time
- Hazards from use of electrical equipment in explosive environment
- Hazards due to high temperature in electrical equipment

### **Static Electricity and Protection**

- What is static electricity?
- Generation of charge
- Common examples of static build-up
- Energy of spark and its ignition capability
- Dangers of static electricity build-up
- Control of static electricity
- Static electricity danger in un-energised overhead lines
- Assessment of static risks and planning prevention

### **Safety Aspects in Electrical Equipment Design and Selection**

- Design of equipment for ensuring safety
- Equipment ratings and fault withstand capability
- Containing and deflecting arcs during equipment faults
- Role of equipment enclosures in ensuring safety-discussion on motor terminal boxes as an example
- Degree of protection and its significance in safety
- Damage due to overload or excessive fault current in electrical conductors
- Types of insulation and their temperature limits

- Protecting electrical systems by over current protective devices (relays, releases, fuses, circuit breakers)
- Detection of hot spots by infrared sensors or viewing devices
- Equipment selection – its contribution to safe operations

## **Safe Operation & Maintenance of Electrical Equipment**

### **Earthing & Bonding**

### **Substation Safety**

### **Safety in Battery Installations**

### **Regulations Governing Workplace Safety**

### **Organizational Requirements of Safety**