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# PRACTICAL HV AND LV SWITCHING OPERATIONS AND SAFETY RULES FOR ENGINEERS AND TECHNICIANS



## **YOU WILL LEARN HOW TO:**

- Appreciate the basic theoretical aspects involved in electrical safety
- Understand the importance of proper isolation procedures for HV and LV equipment
- Understand the coordinating permit access authority procedures
- Gain a clear understanding of the procedures/practices adopted for safe working
- Identify the various statutory and legal regulations/acts dealing with electrical safety at work
- Gain an insight into the organisational aspects of safety (applicable to on-site training)
- Become familiar with the organisation's electrical safety rules (applicable to on-site training)

## **WHO SHOULD ATTEND:**

- Instrumentation and control engineers
- Consulting engineers
- Electrical engineers
- Project engineers
- Maintenance engineers
- Power system protection and control engineers
- Building service designers
- Data systems planners and managers
- Electrical and instrumentation technicians

## The Workshop

In this course, we will take a look at the theoretical aspects of safety as well as the practical and statutory issues. One of the main causes of electrical accidents is said to be incorrect isolation of the circuits where work is to be done. To ensure safety of operators and maintenance personnel, proper switching procedures are necessary and more so when the circuits have multiple feeds and are complex. The possibility of voltage being fed back from secondary circuits needs to be considered as well. This course emphasises on the isolation procedures to ensure proper and safe isolation of HV, LV and secondary circuits.

Electrical safety is not just a technical issue. Accidents can only be prevented if appropriate safety procedures are evolved and enforced. This includes appropriate knowledge of equipment and systems imparted through systematic training to each and every person who operates or maintains the equipment. We will cover all these aspects in detail.

### Pre-requisites

Some working knowledge of basic electrical equipment is required, although this will be covered at the beginning of the course. Real-life experience with such equipment and hands-on testing will enable the workshop to be placed in context.

## Practical Sessions

This is a practical, hands on workshop enabling you to work through practical exercises which reinforce the concepts discussed.

***To gain full value from this workshop, please bring your laptop/notebook computer.***

## The Program

### DAY ONE

#### BASIC THEORY OF ELECTRICAL SAFETY

- Electrical shock - why does it happen?
- Touch and step potential (voltage)
- Direct and indirect contact
- Role of electrical insulation in safety
- Avoiding electric shock-different approaches
- Earthing of power supply systems and its safety implications
- Role of earthing of equipment enclosures (protective earthing) in human safety
- Earthing in outdoor installations

#### ARC FLASH HAZARD AND SAFETY MEASURES

- Arc flash definitions
- Hazards presented by arc flash
- Causes of arc flash
- Arc blast and its consequences
- Concept of incident thermal energy
- Arc flash protection program

#### SAFE OPERATION AND MAINTENANCE OF ELECTRICAL EQUIPMENT

- Key safety issues in O&M of electrical installations
- Isolation and earthing of equipment
- Use of warning signs for operation and maintenance
- Safety while working in outdoor switchyards and overhead lines
- Work on underground cable systems
- Use and upkeep of safety appliances in substations and other electrical premises
- First-aid for burns and electric shock

#### COORDINATING PERMIT ACCESS AUTHORITY PROCEDURES

- Requirements for access to electrical equipment
- Planning for switching and isolation
- Document management
- Communication in switching and isolation
- Auditing of switching and isolation procedures

### DAY TWO

#### OVERVIEW OF HV SWITCHING OPERATIONS

- HV equipments - components and apparatus
- Fundamentals of HV switching operations
- HV switching operations safety
- Restriction pertaining to HV switching equipment
- Isolation of HV transmission and distribution systems
- Commissioning and maintenance of HV equipments

#### OVERVIEW OF LV SWITCHING OPERATIONS

- LV equipments - components and apparatus
- Fundamentals of LV switching operations
- LV switching operations safety
- Commissioning and maintenance of LV equipment

#### SECONDARY ISOLATION PROCEDURES

- Fundamentals of secondary isolations
- Communications for secondary isolations
- Procedural and technical aspects

#### APPLICABLE REGULATIONS AND STANDARDS ON SAFETY

- Necessity of safety rules and standards on safety
- Acts and regulations dealing with safety at the work place
- Regulations related to usage of electricity
- Regulations related to supply of electricity
- Standards for wiring, design and selection of LV installations

#### ORGANISATIONAL ASPECTS OF SAFETY

- Environment, health and safety policy of the organisation
- Mandatory compliance to statutory requirements
- Monitoring safety compliances
- Safety training
- Role of an organisation in ensuring/improving work safety

#### DISCUSSION

- HV and LV switching operations, specific hazards and safety rules applicable

#### SUMMARY, OPEN FORUM AND CLOSING

