



Introduction to the Safe Operation of High Power Systems

Course Introduction:

The purpose of this training course is to establish minimum standards to prevent hazardous electrical exposures to personnel and ensure compliance with regulatory requirements applicable to electrical systems. Working on the equipment in a de-energized state is required unless de-energizing introduces an increased hazard or is infeasible. This course is designed to help ensure that energized high voltage electrical work is performed safely by authorized employees, who are trained and provided with the appropriate safe work procedures, protective equipment and other controls. The course is intended to ensure the employees are protected against electrical shock, burns and other potential electrical safety hazards as well as comply with regulatory requirements.

Course Objectives:

Examining:

- To present the recommended practices, and guides, of which NFPA 70E contained, which are developed through a consensus standards development process approved by the American National Standards Institute.
- To provide The Safety Standards.
- To provide a practical understanding of electrical power system safety.
- To declare the regulatory and legal safety requirements.
- To demonstrate the earthing systems Safety and Risk Assessment.
- To explain the relation between maintenance activities for various equipment and safety.
- To select and maintain the electrical equipment in hazardous areas and its standard.
- To indicate arc flash hazard and mitigation.
- To introduce main recommendations for electrical safety.
- To review of general work and plant safety rules.

Who Should Attend?

Electrical power generation systems and distribution engineers and technicians in utilities and industrial plants, managers of private electricity producers and large power consumers, substation engineers, consulting engineers, manufacturers of power equipment and technologists and other technical personnel involved in the design, operation and maintenance of high/medium/low voltage power systems.

Course Outline:

Day1:

1- The Law and Regulations Applying to Electrical Work

- Occupational Health & Safety Act
- Electrical Safety Rules and procedures for oil and gas

- Electrical Utility Safety Association
- Internal Safety Rules & Regulations

Electrical Safety Codes and Standards

Types of Standards

- NFPA 70
- OSHA
- NFPA 70E
- Other standards and resources

2- Electrical Hazards from High Voltage Equipments

- Electrical Shock
- Arc Flash
- Arc Blast

Factors Affecting the Severity of Electric Shock

The basic principles of safety in normal and abnormal conditions

IEC Standard 479-1 Time/Current Zones effects of AC currents on persons

Day 2:

3- Arcing Flash/Blast Review with safety Suggestions

- Arc Fault Hazards
- Safe Working Distances
- Incident Energy Related to Risk
- Reducing the Risk
- Suggestions for Safety

4- Arc-Flash Hazard Analysis

- Types of Faults
- Importance of Performing Arc Flash Hazard Analysis
- Regulating Authorities and Arc-Flash Hazard Protection
- Method of calculation
- Steps required to accurately calculating Incident Energy
- Arc Exposure Thresholds and Parameters
- Arc Exposure Controls
- Cold Weather Clothing

Case Studies

Day 3:

5- Electrical Substation Equipment

- Introduction
- Substation Functions
- Substation Equipments

6- Fundamentals of Distribution Systems

- Primary Distribution Configurations
- Urban Networks
- Primary Voltage Levels
- Distribution Substations
- Subtransmission Systems

7- High voltage safety rules

- Approach to Electrical Apparatus
- Minimum Approach Distance (MAD)
- Authorized Persons
- Approach Table
- Minimum Approach Distances - Vehicles and Plant

Day 4:

8- Safety Requirements for Work on High Voltage Systems

- Permit to Work Process
- Work Permit Documents
- Permit to Work Procedure
- Handover Certificates
- Operating Agreements
- Isolation of Apparatus
- Isolation Points
- Earthing
- Program Earths
- Working Earths
- Portable Earths
- Temporary Removal of Program Earths
- Location of Earths
- Electromagnetic Induction

9- Safety Precautions for High Voltage Live Line Work

- Minimum Requirements for Live Line Work
- Weather Effect

10- Personal Protective Equipment and Arc-Flash Protection

- Personal Body Protective Equipment
- Testing and Grounding
- Live Line Tools
- Glasses
- Gloves & Rubber Equipment
- Clothes
- Boots
- Head Protection

Case Studies

Day 5:

11- Minimum Requirements for the Control of Hazardous Energy (Lockout/Tagout)

- Scope, Application & Purpose
- Definitions
- Rules & Responsibilities
- Compliance with this Program
- Training & Communication
- Sequence of Lockout
- Contractor's Responsibilities
- Evaluation of Program Effectiveness

12-Introduction to Electrical Protection

- The Need for Electrical Protection
- Overview of Electrical Faults
- Protective Relaying
- Power System Bus Configurations
- The Nature of Relaying
- Protection Components

Case studies and Tutorials

Discussion and Conclusion

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Fees:

To be advised as per course locations. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:30 - 08:50	Morning Coffee/Tea
08:50 - 10:20	First Session
10:20 - 10:40	Recess (Coffee/Tea/Snacks)
10:40 - 12:20	Second Session
12:20 - 12:40	Recess (Coffee/Tea/Snacks)
12:40 - 14:30	Last Session