



Technology Training that Works

Arc Flash Protection for Electrical Safety Professionals

WHAT YOU WILL LEARN:

Electrical safety is an important issue for those working on electrical facilities in utility networks and large industrial installations. A number of serious accidents including fatalities occur every year due to accidents involving electricity resulting in huge financial losses and wasted man-hours. Arc flashes in electrical equipment are now considered one of the major causes of electrical accidents even surpassing the well known hazards of electric shock. Avoiding arc flash incidents and the resulting injuries is one of major challenges today facing electrical workers and requires adequate attention in the stages of system planning, design, installation, operation and maintenance.

Injuries due to arc flash can depend on many factors, one of which is the incident thermal energy on a worker exposed to a flash. Today, a considerable body of knowledge exists as a result of research efforts and is available to designers and maintenance engineers in the form of standards such as IEEE 1584 and NFPA 70E. This course will detail the basis of this approach and also about the major advances have been made in the area of PPE made of HR fabrics and rated for different levels of thermal exposure.

Prevention however still remains the best form of protection and switchgear manufacturers have made considerable design advances to ensure that the effect of arc flash incidents is contained within the enclosure of switchgear (often called arc flash resistant switchgear) and methods of testing such switchgear have also evolved simultaneously. Another important factor is the approach to avoid arc incidents within the switchgear by proper design and maintenance and techniques to reduce the severity of the flash should such incidents occur.

This course will cover the requirements for work practices that workers should use to avoid injury from a release of electrical energy when performing tasks involving electrical power. The specific information enables the reader to prevent or minimize exposure to all widely recognized electrical hazards.

WHO SHOULD ATTEND?

This course is designed for personnel who want to understand the safety principles and work practices. Those who will benefit the most from this workshop include the following:

- Electrical Engineers
- Consulting Engineers
- Electrical Maintenance Engineers
- Safety Engineers
- Project Engineers
- Power System Protection and Control Engineers
- Electrical and Instrumentation Technicians



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OUTLINE:

The arc flash protection course is a comprehensive, highly practical and interactive two-day course. You will have an opportunity to learn and discuss the various issues related to hazards in operation and maintenance work in electrical installations. You will learn the theoretical fundamentals related to the danger of arc flash and its protection. The workshop would begin with the introductory topics of various types of hazards and the effects of arc flash. Thereafter theoretical and design aspects related to electrical faults would be covered. The second day would mostly deal with issues related to arc flash studies, procedures, categorization and control. You will also be provided with a high quality course manual that IDC is known for. This course manual will be useful for many years after the course.

WORKSHOP OBJECTIVES

At the end of this workshop delegates will understand:

- Identify the important hazards in O&M work in different parts of electrical installations
- Recognize the dangers of arc flash events to working personnel and their impact on equipment
- Know the codes and standards dealing with arc flash danger
- Acquire the necessary theoretical knowledge to carry out arc flash impact studies by collecting system data and computing the arc flash incident energy and flash protection boundary
- Understand the importance of proper design of electrical equipment in avoiding arc flash incidents and ensuring safety in the event of an arc flash.
- Select appropriate Personal Protective Equipment (PPE) and FR clothing required for avoiding serious or lethal injuries

TIMING:

Workshop timing is generally 8am registration and a prompt start at 8.30am with lunch at 12.30 and a finish no later than 5pm. There will be 15minute morning and afternoon breaks. These can easily be varied for on-site presentations.

CONTENT SUMMARY

REGISTRATION, INTRODUCTIONS AND ACKNOWLEDGMENTS

MODULE 1

Overview of electrical hazards

- General Hazards
- Electrical Hazards and Safety Measures

MODULE 2

Arc flash and its effects

- Arch Flash Mechanism
- Effects of Arc Flash
- Incident energy of arc and arc flash hazards
- Location affects the hazard
- Consequences of an arc flash incident



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MODULE 3

Fundamentals of power system

- Voltage levels and faults
- Bolted Vs Arc Fault currents
- Earthing and its influence on Arc Faults

MODULE 4

Fault current calculations

- Typical fault currents in various voltage levels
- Electrical networks represented by equivalent diagram
- Concept of base MVA for equivalent circuits
- Typical calculations using numerical examples

MODULE 5

Protection of electrical power systems

- Detection of Fault Currents
- Fuses for Protection
- Protective Relays

MODULE 6

Arc flash studies

- Safety standards for Arc Flash hazards
- Research in Arc Flash hazards
- Basic requirements stipulated in standards
- Guide for Arc Flash hazard analysis

MODULE 7

Arc flash study detailed procedure

- Flash protection approach boundary
- Detailed Arc Flash Study
- Incident energy calculations
- Methods of applying the model
- Warning labels/ Personal Protective Equipment (PPE)

MODULE 8

Data collection and system modeling

- Data collection
- Determine system modes of operation
- Lower short circuit conditions with long tripping times

MODULE 9

Determining Arc Flash risk category

- Flash hazard analysis
- Hazard risk category / PPE matrix table approach
- Hazard risk category for metal clad switchgear 1kV and above
- Simplified table approach
- Comparison of flash hazard analysis methods



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MODULE 10

Controlling arc flash hazards

- Eliminating Arc Flash events
- Avoiding Arc Flash risks
- Mitigating arc effects

MODULE 11

Personal protective equipment

- Evolution of flame resistant fabrics
- Fire resistant clothing

SUMMARY & OPEN FORUM

COMPLETE FEEDBACK SHEETS

CLOSING