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Arc Flash Analysis Training

Contact us Today for a FREE quotation to deliver this course at your company?s location.

https://www.electricityforum.com/onsite-training-rfq

An arc flash analysis study is usually performed through the collection of data from existing electrical equipment and systems, followed by the proper calculation of arc flash hazards and requirements by an experienced electrical engineer. This can be done using either the manual method using IEEE 1584 calculations or using popular arc flash study/short circuit study analysis software.

An effective arc flash analysis training program should provide electrical engineers with the knowledge and understanding of how to perform such an analysis/study.

Performing arc flash hazard analysis study on an electrical distribution system is cruicial to understanding the potential arc flash hazard of electrical equipment.

An arc flash analysis study is not a one-time event, but rather it is just a snapshot of the electrical system at one specific point in time. Any changes to the electrical system can potentially affect the accuracy of the arc flash analysis.

But once arc flash analysis study in place, it must be maintained if it is to remain effective. Updating the Arc Flash Anaysis Study program maintenance involves two critical elements:

the study itself and electrical worker safety training.

Section 130.5 of NFPA 70E Standard for Electrical Safety in the Workplace specifies that arc flash hazard analysis shall be updated whenever there is a major modification or renovation to the electrical system (e.g., changing a feed or adding large motors). Even in the absence of such changes, NFPA 70E still mandates reviewing the arc flash study a maximum of every five years to account for the many little changes that can have a big impact on study results.

“Retraining” in NFPA 70E/CSA Z462

Like as in the case of the arc flash analysis study, proper training of qualified electrical workers in NFPA 70E/CSA Z462 is not a one time event. Workers leave; new ones are added; people simply forget what they have learned.

NFPA 70E section 110.2(D)(3) specifies additional as-needed worker training under certain conditions, but it also mandates retraining all qualified workers at an interval not to exceed three years. Some companies have adopted a yearly retraining policy, due to the importance of the NFPA 70E electrical safety concepts.

Arc flash analysis training educates electrical professionals about the existence, nature, causes and methods to prevent electrical hazards. Arc flash is a serious hazard with potentially devastating potential injury. Our arc flash analysis training course includes information on arc flash awareness, standards and codes, understanding of arc flash quantities, selection and use of appropriate PPE, reading and following warning signs and labels, methods to reduce risk while working on live exposed parts, arc flash hazard assessment and documentation. This is done to ensure electrical worker safety and meeting the challenges of the arc flash safety requirements can be a difficult task. From arc flash analysis and labeling to personal protective equipment and training.

Who Needs Arc Flash Analysis Training?

Most commercial, institutional, and industrial electrical systems have arc flash hazards. In the United States, OSHA requires that those systems be individually analyzed and, if hazards

exist, labeled to identify the arc flash boundary, the incident energy at the working distance, and the required personal protective equipment (PPE).

Our Arc Flash Analysis Training course teaches arc flash analysis in the following areas:

Arc flash hazard analysis
Arc flash hazard labeling plan
Site review / compliance assessment
Mitigation services
Single-line diagrams
Short circuit and coordination studies
Preventative maintenance
Electrical safety program review / development
Arc Flash Training
Personal protective equipment plan
Documentation
Arc flash hazard analysis

Arc Flash Hazard Analysis
Canadian Standards Association (CSA) Z462 guidelines require facility owners to perform an arc flash hazard analysis prior to allowing a worker or contractor to perform a task on energized equipment. The arc flash analysis identifies the presence and location of potential hazards and provides recommendations for personal protective equipment (PPE), boundaries for limited, restricted and prohibited approaches, recommendations for flash protection and safe work practices.

The Electricity Forum recommends that arc flash calculations be completed in conjunction with short circuit study calculations and protective device coordination to achieve the most accurate arc flash hazard results. Short circuit and coordination studies verify protective devices and arc hazard ratings, calculate momentary interrupting and relay currents,

establish settings for all types of protective devices and coordinate your entire power distribution system to minimize downtime.

COURSE OBJECTIVES

Learn about arc flash hazards, standards, safety and calculations. This course is designed to educate participants about all aspects of arc flash studies.

LEARNING OBJECTIVES

Upon completion of this course, the student will learn how to:

- Develop A Realistic Risk Assessment, Ensuring Proper Personnel Safety And Increased Compliance By Workers
- Eliminate Hours Of Engineering Time And Prevent Costly Mistakes
- Assure Electrical System Reliability
- Provide Documentation And Labeling For Your Arc Flash Hazard Safety Program
- Avoid Unnecessary Costs From Over Specification Of Gear, Providing Higher Potential Worker Productivity — Savings Thousands Of Dollars On An Annual Basis!
- Understand Short Circuit Study Fundamentals
- Understand Arc Flash Study Fundamentals
- Comply With Standards For Limits Of Approach
- Produce Arc Flash Labeling
- Perform Arc Flash Approach Boundary Calculations And More!

WHO SHOULD ATTEND

This Arc Flash Analysis Training Course is intended for electrical engineers, plant supervisors, electrical maintenance professionals and electricians who are involved with industrial, commercial and institutional electric power distribution systems: Plant, facility, and corporate electrical engineers dealing with one or more company distribution systems, and consulting and utility engineers dealing with clients' systems. Consultants, architect-engineers will also find this course very beneficial.

STUDENTS RECEIVE

- FREE 100-Page Digital Electrical Safety Handbook (Value $20)
- $100 Coupon Toward Any Future Electricity Forum Event (Restrictions Apply)
- 1.4 Continuing Education Unit (CEU) Credits
- FREE Magazine Subscription (Value $25.00)
- Course Materials In Paper Format

COURSE OUTLINE

COURSE CONTENT

POWER SYSTEM FUNDAMENTALS

Power System Fundamentals
Balanced Three-Phase Loads
Unbalanced Three-Phase Loads
Power distribution systems
Effects of frequency
Single-phase power loads
Three-phase balanced and unbalanced power loads
Short Circuit Theory, Terminology and Studies
Fault Current Sources and Characteristics
Power System Configurations

Typical System configurations
Design considerations
Radial systems, loop systems, selective systems

POWER SYSTEM SUBSTATION CONFIGURATIONS
Functions of a substation
Design considerations
Radial, loop, and selective systems
Introduction
Why do the calculation?
When to do the calculation?

ELECTRICAL FAULTS
Definitions and Terminology
Arcing Faults vs. Bolted Faults
Causes
Effect of Current on Overcurrent Device Clearing Time
Current Limiting
Effects on Personnel and Equipment

NFPA 70e/CSA Z462 and ELECTRICAL SAFETY PROGRAMS
Safe Approach Distances
Qualified vs. Unqualified Workers
Work on or Near Energized Electrical Equipment
Energized Electrical Work Permit
Safe Work Practices and Procedures
Calculation Methodology
Step 1: Construct the System Model and Collect Equipment Parameters
Step 2: Calculate Equipment Short Circuit Impedances
Network Feeders

Synchronous Generators and Motors
Transformers
Cables
Asynchronous Motors
Fault Limiting Reactors
Static Converters
Other Equipment
Step 3: Referring Impedances
Step 4: Determine Thévenin Equivalent Circuit at the Fault Location
Step 5: Calculate Balanced Three-Phase Short Circuit Currents
Initial Short Circuit Current
Peak Short Circuit Current
Symmetrical Breaking Current
DC Short Circuit Component
Step 6: Calculate Single-Phase to Earth Short Circuit Currents

Worked Examples
Step 1: Construct the System Model and Collect Equipment Parameters
Step 2: Calculate Equipment Short Circuit Impedances
Step 3: Referring Impedances
Step 4: Determine Thévenin Equivalent Circuit at the Fault Location
Step 5: Calculate Balanced Three-Phase Short Circuit Currents
Initial Short Circuit Current
Peak Short Circuit Current

Computer Software

DAY TWO

MODELING AN ELECTRICAL SYSTEM IN PER-UNIT
Modeling methods

Data collection and modeling
Per-unit impedance calculations
Complex impedance diagrams

SHORT CIRCUIT STUDIES
Purposes of fault calculations
Effects of short circuits
Fault current sources
Machine reactance modeling
Fault current characteristics
Types of faults/magnitudes
Fault calculation procedures

PROTECTIVE COORDINATION
Typical Device Curves and Settings
Transformer Protection
Feeder Protection
Motor/Generator Protection
Type 2 Coordination
Fault Let-Through
Approved Series Combinations

LOW VOLTAGE EQUIPMENT RATINGS AND SELECTION CRITERIA
Low voltage fuses
Molded case circuit breakers
Busway and conductors

SWITCHGEAR RATINGS AND SELECTION CRITERIA
Low voltage power circuit breakers
Power fuses
Load interrupters

Medium voltage power circuit breakers
Equipment Ratings and Asymmetrical Factors
Analysis of a Computerized Fault Study

COURSE TIMETABLE

Both days:

Start: 8:00 a.m.
Coffee Break: 10:00 a.m.
Lunch: 12:00 noon
Restart: 1:15 p.m.
Finish: 4:30 p.m.