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High Voltage Grounding Training

View Course Details

COURSE DATES AND TIMES

High voltage substations must safely dissipate thousands of amperes of fault current into the earth. Improper grounding design can produce dangerous step and touch voltages, ground potential rise (GPR), and equipment damage.

This course explains how substation grounding systems are designed using IEEE Std 80 engineering methods, including grounding grid design, soil resistivity analysis, fault current distribution, and step- and touch-voltage safety calculations.

Participants learn how grounding grids, ground rods, and bonding conductors are designed to control voltage gradients and protect personnel in medium- and high-voltage substations.

A properly designed and installed grounding system ensures the reliable performance of electrical substations. Fast fault clearing, made possible by good grounding, improves the overall safety and reliability of an electrical system.

Understanding these principles will provide the right tools for designing grounding systems for utility networks and industrial plant distribution. This course covers the basic procedures for working safely on medium and high voltage systems.

This comprehensive course focuses on the latest practices and standards for grounding and bonding in high-voltage systems. Participants will gain a deep understanding of safe grounding methods, conductor sizing, substation grounding design, surge protection, and bonding practices, specifically tailored for utility and industrial applications.

Course Overview

- Fundamentals of High-Voltage Grounding
- Electrical Bonding in High Voltage Systems
- Proper Sizing of Conductors for Grounding Applications
- Grounding of Substations – Best Practices and Design Criteria
- High-Voltage Surge Protection

- Electrical Grounding for Lightning Protection
- IEEE Std 80 and its Latest Revisions for Grounding Design

Learning Outcomes

- The basic principles of grounding of medium and high voltage electrical systems
- Protective or Safety grounding system
- Safe and unsafe working conditions
- Design considerations of a grounding grid for medium and high voltage
- Measuring ground resistance and resistivity in substations
- Protection of substations from lightning energy

WHO SHOULD ATTEND

This course is designed for professionals responsible for the design, operation, and maintenance of high-voltage electrical systems, including:

• Utility and industrial electrical engineers
• Substation design engineers
• Power system engineers
• Electrical technicians and technologists
• Electricians working in high-voltage environments
• Maintenance and operations personnel
• Engineering consultants
• Electrical safety specialists

STUDENTS RECEIVE

- High Voltage Grounding Training Course Certificate
- 0.6 Continuing Education Unit (CEU) Credits (6 Professional Development Hours)
- 100-Page Digital Electrical Grounding Handbook - Value $20 (details below)
- A FREE Magazine Subscription (Value $25)
- $50 Coupon toward any future Electricity Forum event (restrictions apply)
- Course Materials in PDF Format

COURSE OUTLINE

High Voltage Grounding and Bonding For Utility and Industrial Applications

Session 1: High-Voltage Grounding Fundamentals and Safety Principles

Objective: Establish the safety principles and system protection concepts behind grounding in high-voltage power systems.

Topics Covered
• Purpose of grounding in power systems
• Ground fault current behavior
• Ground potential rise (GPR)
• Step and touch voltage hazards
• Electrical shock physiology
• Protective grounding and bonding
• Overview of IEEE Std 80 and IEEE 81
• Grounding objectives in substations

Session 2: Soil Resistivity and Ground Resistance Testing

Objective: Explain how soil characteristics affect grounding system performance and how resistivity testing is performed.

Topics Covered
• Soil resistivity fundamentals
• Effects of soil conditions on grounding
• Seasonal soil variations
• Wenner four-point resistivity test
• Soil modeling basics
• Ground resistance measurements
• Interpreting resistivity test data
• Applying test results to design

Session 3: Substation Grounding Grid Design

Objective: Introduce the engineering principles used to design grounding grids for substations.

Topics Covered
• Grounding grid purpose
• Grid layouts and spacing
• Horizontal grounding conductors
• Vertical ground rods
• Conductor sizing for fault current
• Ground grid resistance calculations
• Fault current distribution
• Surface layer safety materials

Session 4: Step and Touch Voltage Analysis

Objective: Evaluate grounding systems to ensure safe step and touch voltage levels.

Topics Covered
• Step voltage hazards

• Touch voltage hazards
• Allowable voltage limits
• IEEE 80 calculation methods
• Voltage gradient control
• Surface layer effects
• Grid spacing strategies
• Voltage mitigation techniques

Session 5: Substation Equipment Grounding

Objective: Examine grounding requirements for major substation equipment and structures.

Topics Covered
• Transformer grounding
• Circuit breaker grounding
• Bus structure bonding
• Cable shield grounding
• Capacitor bank grounding
• Control building grounding
• Fence and structure bonding
• Surge protection grounding

Session 6: Transmission and Protective Grounding

Objective: Review grounding methods for transmission systems and maintenance safety.

Topics Covered
• Transmission structure grounding
• Steel and wood pole grounding
• Overhead ground wires
• Lightning protection grounding
• Temporary protective grounding
• Grounding de-energized equipment
• Equipotential grounding practices
• Field safety considerations

COURSE SCHEDULE:

Start: 10 a.m. Eastern Time
Finish: 4:30 p.m. Eastern Time

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

Request Quote