Advanced High Voltage Equipment Maintenance and Safety Training Course



21 - 25 Dec 2026

Cape town

4600 € (Per Person)

Ref: #INM2142_277560

Course Introduction / Overview:

This course provides a comprehensive and in-depth exploration of high voltage electrical equipment maintenance and safety protocols. In an era where industrial operations are heavily reliant on uninterrupted power, the ability to safely manage and maintain high voltage systems is paramount. This program is meticulously designed to bridge the gap between theoretical knowledge and practical application, ensuring that participants can confidently handle the complexities of HV environments. Drawing upon principles outlined in foundational texts like Donald G. Fink's "Standard Handbook for Electrical Engineers," the curriculum covers everything from fundamental electrical theory to advanced diagnostic techniques and emergency response procedures. Participants will delve into critical topics such as arc flash hazard analysis, lockout/tagout (LOTO) procedures, and predictive maintenance strategies for key assets like transformers and switchgear. BIG BEN Training Center has developed this course to empower professionals with the skills needed to enhance system reliability, ensure personnel safety, and maintain compliance with international standards such as NFPA 70E and OSHA regulations, ultimately fostering a culture of safety and operational excellence within their organizations.

Target Audience / This training course is suitable for:

- Electrical Engineers and Technicians.
- Maintenance Supervisors and Managers.
- Substation Operators and Engineers.
- Health and Safety Managers and Officers.
- Project Engineers involved with electrical systems.
- Plant and Facility Managers.
- Electrical Contractors and Consultants.
- Instrumentation and Control Technicians.

Target Sectors and Industries:

- Electrical Power Generation, Transmission, and Distribution.
- Oil and Gas Exploration and Refining.
- Heavy Manufacturing and Industrial Plants.
- Mining and Mineral Processing.
- Renewable Energy sectors including Wind and Solar Farms.
- Data Centers and Large Commercial Facilities.
- Transportation and Railway Systems.
- Government, Military, and Public Utility Agencies.

Target Organizations Departments:

- Maintenance and Engineering.
- Operations and Production.
- Health, Safety, and Environment (HSE).
- Facilities Management.
- Project Management and Capital Projects.
- Technical Services and Support.
- Asset Management.
- Quality Assurance and Compliance.

Course Offerings:

By the end of this course, the participants will have able to:

- Develop and implement robust safety procedures for high voltage work environments.
- Perform effective maintenance on power transformers, circuit breakers, and switchgear.
- Correctly apply lockout/tagout (LOTO) and energy isolation procedures.
- Conduct comprehensive electrical hazard and risk assessments.
- Select and properly utilize Personal Protective Equipment (PPE) for electrical work.
- Interpret single-line diagrams and electrical schematics for troubleshooting.
- Understand the principles of protective relaying and coordination.
- Respond effectively to electrical incidents and emergencies.
- Apply predictive maintenance techniques to improve equipment reliability.
- Ensure compliance with key industry standards like OSHA and NFPA 70E.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to be highly interactive, engaging, and practical, ensuring that participants not only learn the material but can also apply it effectively in their workplace. This course moves beyond traditional lectures by incorporating a blended learning approach. We utilize detailed case studies of real-world electrical incidents to analyze root causes and preventive measures, fostering critical thinking and problem-solving skills. Interactive group discussions and workshops encourage participants to share their experiences and collaboratively tackle complex maintenance and safety scenarios. The sessions will feature high-quality visual aids, including videos and schematic diagrams, to clarify complex concepts related to high voltage equipment. Our expert instructors facilitate hands-on (simulated) exercises on procedures like LOTO and equipment testing protocols. Continuous feedback is provided throughout the course, with structured Q&A sessions to address specific challenges and queries. This immersive and participant-centered approach ensures maximum knowledge retention and the development of practical competencies essential for working safely with high voltage systems.

Course Agenda (Course Units):

Unit One Fundamentals of High Voltage Systems and Electrical Safety

- Introduction to high voltage principles and terminology.
- Understanding the physics of electrical hazards like shock and arc flash.
- Overview of international safety standards (OSHA 1910, NFPA 70E).
- Establishing an electrically safe work condition.
- Roles and responsibilities of electrical personnel.
- Reading and interpreting electrical single-line diagrams.
- Fundamentals of electrical grounding and bonding.

Unit Two High Voltage Switchgear and Circuit Breaker Maintenance

- Types of switchgear (metal-clad, metal-enclosed, pad-mounted).
- Principles of operation for various circuit breakers (oil, vacuum, SF6).
- Routine inspection and preventive maintenance procedures.
- Techniques for insulation resistance and contact resistance testing.
- Introduction to circuit breaker timing tests.
- Safety protocols for racking breakers in and out.
- Common failure modes and troubleshooting techniques.

Unit Three Power Transformers and Substation Equipment Maintenance

- Transformer theory, construction, and components.
- Transformer cooling methods and maintenance.
- Dissolved Gas Analysis (DGA) and oil quality testing interpretation.
- Maintenance of tap changers, bushings, and surge arresters.
- Inspection and testing of instrument transformers (CTs and PTs).
- Substation battery system maintenance and testing.
- Overall substation inspection and safety checklists.

Unit Four Protective Relaying, Control Systems, and Testing

- Fundamentals of electrical system protection and coordination.
- Types of protective relays (overcurrent, differential, distance).
- Understanding relay settings and logic diagrams.
- Introduction to testing procedures for protective relays.
- Basics of Supervisory Control and Data Acquisition (SCADA) systems.
- Troubleshooting control circuits and wiring.
- Importance of proper documentation and record-keeping.

Unit Five Advanced Safety Procedures and Emergency Response

- Conducting an arc flash hazard analysis.
- Determining arc flash boundaries and required PPE.
- Developing and implementing a comprehensive LOTO program.
- Safe work practices for specific tasks like high voltage cable testing.
- Investigating electrical incidents and near misses.
- First aid and emergency response for electrical shock victims.
- Developing a site-specific electrical safety program.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

Beyond regulatory compliance, how can a proactive safety culture fundamentally transform an organization's approach to high voltage maintenance and risk management?

What unique qualities does this course offer compared to other courses?

This course distinguishes itself by adopting a holistic and deeply practical approach to high voltage systems management, moving beyond mere procedural instruction. While other courses may focus narrowly on either maintenance or safety, this program integrates them seamlessly, reinforcing the principle that safe practices are inherent to effective maintenance. We emphasize the development of a "safety mindset" rather than simple rule-following, empowering participants to think critically and make sound judgments in dynamic, high-risk environments. The curriculum is enriched with detailed analyses of real-world case studies, providing invaluable lessons from both successes and failures in the industry. Instead of just presenting standards, we explore the rationale behind them, ensuring a deeper understanding of why certain procedures are critical. The course content is continuously updated to reflect the latest technological advancements in predictive maintenance and diagnostic testing, ensuring participants leave with current, relevant, and immediately applicable skills that enhance both personal safety and organizational reliability.