Advanced High Voltage Electrical Safety and Switching Training Course



14 - 18 Dec 2026

Cape town

4600 € (Per Person)

Ref: #ERE1618_273648

Course Introduction / Overview:

This comprehensive training course provides an in-depth exploration of the principles and practices essential for working safely with high-voltage electrical systems. In environments where the margin for error is non-existent, a profound understanding of electrical hazards, risk mitigation, and procedural discipline is paramount. This program moves beyond basic compliance, delving into the complex dynamics of high-voltage operations, including arc flash phenomena, as extensively studied by pioneers like Ralph H. Lee. Participants will engage with the core concepts outlined in critical industry standards such as NFPA 70E and IEEE 1584, learning not just the rules but the scientific reasoning behind them. The curriculum is designed to be both theoretical and intensely practical, referencing authoritative texts like the "Electrical Safety Handbook" by John Cadick to ground learning in established best practices. BIG BEN Training Center has developed this course to empower professionals with the knowledge to create and implement robust safety protocols, execute complex switching plans flawlessly, and foster a culture of uncompromising safety within their organizations. It is an essential program for anyone responsible for the operation, maintenance, or management of high-voltage infrastructure, ensuring they can protect personnel, prevent equipment damage, and maintain operational continuity.

Target Audience / This training course is suitable for:

- Electrical Engineers and Technicians.
- High Voltage Substation Operators.
- Maintenance and Operations Supervisors.
- Electrical Safety Officers and HSE Professionals.
- Project Managers overseeing electrical installations.
- Authorized and Competent Electrical Persons.
- Utility and Industrial Electricians.
- Commissioning Engineers and Technicians.
- Plant and Facility Managers.

Target Sectors and Industries:

- Electrical Power Generation, Transmission, and Distribution.
- Oil and Gas Production and Refining.
- Heavy Manufacturing and Industrial Plants.
- Renewable Energy sectors including Wind and Solar Farms.
- Data Centers and Mission-Critical Facilities.
- Mining and Mineral Processing Operations.
- Large Commercial and Institutional Facilities.
- Government, Military, and Defense Installations.
- Transportation and Railway Electrification.

Target Organizations Departments:

- Operations and Maintenance.
- Engineering and Technical Services.
- Health, Safety, and Environment (HSE).
- Project Management and Execution.
- Facilities Management.
- Asset Management and Integrity.
- Training and Development.
- Commissioning and Decommissioning.

Course Offerings:

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

- Analyze and interpret key high-voltage electrical safety standards like NFPA 70E.
- Conduct comprehensive arc flash hazard analyses and establish safe approach boundaries.
- Develop and implement rigorous Lockout/Tagout (LOTO) procedures for complex systems.
- Create and execute detailed, step-by-step high-voltage switching plans.
- Select, inspect, and correctly use appropriate Personal Protective Equipment (PPE).
- Identify and mitigate common hazards associated with substations and switchgear.
- Understand the principles of safe electrical testing and diagnostic procedures.
- Develop effective emergency response plans for electrical incidents.
- Promote a proactive electrical safety culture within their teams and organization.

Course Methodology:

The training methodology employed by BIG BEN Training Center is designed for maximum knowledge retention and practical application. This course adopts a blended learning approach that combines expert-led instruction with highly interactive and participatory sessions. Theoretical concepts are introduced through clear presentations and are immediately reinforced with real-world case studies of electrical incidents, allowing participants to analyze failures and successes in a controlled environment. A significant portion of the training is dedicated to group workshops where attendees will collaborate on developing risk assessments and complex switching plans for various scenarios. This hands-on approach ensures that participants can translate theory into practice. Interactive discussions, Q&A sessions, and video analysis of safe and unsafe work practices are used extensively to stimulate critical thinking and engagement. The learning environment is collaborative, encouraging participants to share their own experiences and challenges. Our expert instructors provide continuous feedback and guidance, ensuring that every individual master the critical skills needed to operate safely and effectively in high-voltage environments. The focus is on building competence and confidence, not just on passing an exam.

Course Agenda (Course Units):

Unit One: Fundamentals of High Voltage and Electrical Safety Governance

- Introduction to High Voltage Systems and Terminology.
- The Physics of Electrical Hazards: Shock, Arc Flash, and Arc Blast.
- Understanding Key Regulations: OSHA 29 CFR 1910, NFPA 70E, and IEEE 1584.
- Roles and Responsibilities of Authorized and Competent Persons.
- The Psychology of Electrical Safety and Human Performance Factors.
- Establishing an Electrically Safe Work Condition.
- Interpreting Electrical Single-Line Diagrams and Schematics.

Unit Two: Electrical Hazard Analysis and Risk Mitigation

- Principles of Electrical Risk Assessment and Job Safety Analysis (JSA).
- Arc Flash Hazard Analysis: Methods and Calculations.
- Determining Arc Flash Boundaries and Incident Energy Levels.
- Shock Hazard Analysis and Approach Boundaries.
- The Hierarchy of Control for Electrical Hazards.
- Developing and Implementing an Electrical Safety Program.
- Case Studies of Major Electrical Incidents and Lessons Learned.

Unit Three: Safe Work Practices and Personal Protective Equipment (PPE)

- Detailed Application of Lockout/Tagout (LOTO) Procedures.
- The Electrical Permit-to-Work System.
- Selection, Use, and Maintenance of Arc-Rated Clothing and PPE.
- Requirements for Insulated Tools and Equipment.
- Temporary Protective Grounding Principles and Application.
- Working On or Near Energized and De-energized Equipment.
- Safety Procedures for Working in Confined Spaces with Electrical Hazards.

Unit Four: High Voltage Switching Operations and Procedures

- Principles of High Voltage Switchgear Operation (Circuit Breakers, Isolators, Fuses).
- Developing Safe and Sequential Switching Plans.
- Communication Protocols for Switching Operations.
- Safety Interlocks and Defeat Procedures.
- Practical Considerations for Rack-in and Rack-out Procedures.
- Substation Entry and Work Procedures.
- Simulated Switching Exercises and Scenario-Based Problem Solving.

Unit Five: Equipment Maintenance, Testing, and Emergency Response

- Safe Maintenance Procedures for Transformers, Switchgear, and Cables.
- Principles of High Voltage Equipment Testing and Diagnostics.
- Insulation Resistance and Dielectric Strength Testing.
- Battery System Safety and Maintenance.
- Developing an Emergency Response Plan for Electrical Incidents.
- First Aid for Electrical Shock and Burn Victims.
- Course Review, Final Assessment, and Action Planning.

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:

How might the integration of smart grid technologies and remote switching capabilities fundamentally alter the traditional hands-on safety protocols and human-in-the-loop requirements for high-voltage operations?

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

This course distinguishes itself by focusing intensely on the practical application of safety principles in complex, real-world scenarios. While many programs cover the theoretical aspects of NFPA 70E and OSHA standards, this training dedicates significant time to hands-on workshops where participants collaboratively develop detailed switching plans and risk assessments for challenging situations. It moves beyond simple compliance, aiming to instill a deep-seated safety intuition by analyzing case studies of actual electrical incidents, exploring not just what happened, but the chain of human factors and systemic failures that led to the event. The curriculum emphasizes the "why" behind the safety rules, ensuring that participants understand the physics of arc flash and electrocution, which fosters a more profound respect for the hazards. Rather than just listing PPE requirements, we explore the science of arc-rated materials and the limitations of protective gear. The instruction is rooted in an operational context, making the learning directly transferable to the participant's daily work, empowering them to become true safety leaders who can critically evaluate procedures, challenge unsafe practices, and champion a culture of vigilance and prevention within their organizations.