Diesel Generator Operation and Electrical Maintenance Training Course



21 - 25 Dec 2026

Cape town

4600 € (Per Person)

Ref: #INM7372_277500

Course Introduction / Overview:

This comprehensive training course provides an in-depth exploration of diesel generator operation and electrical maintenance, designed to equip participants with the essential skills for ensuring reliable power generation. In a world heavily reliant on uninterrupted power, the role of a skilled generator technician is paramount. This program, offered by BIG BEN Training Center, delves into the core principles of diesel engines, alternators, control systems, and associated electrical components. Drawing upon foundational concepts outlined in works like the "Diesel Generator Handbook" by L. L. J. Mahon, the curriculum bridges the gap between mechanical theory and practical electrical application. Participants will move from understanding basic operational procedures to mastering advanced troubleshooting and preventative maintenance strategies. The course emphasizes a systematic approach to fault finding, interpreting electrical schematics, and adhering to critical safety standards, ensuring that generators are not only operational but also safe and efficient. This training is structured to build confidence and competence, transforming attendees into valuable assets capable of managing and maintaining critical power systems effectively.

Target Audience / This training course is suitable for:

- Electrical Engineers and Technicians.
- Mechanical Engineers and Technicians.
- Maintenance Supervisors and Managers.
- Facilities Management Professionals.
- Power Plant Operators.
- Marine Engineers.
- Field Service Technicians.
- Project Engineers involved in power systems.
- Stationary Engineers.

Target Sectors and Industries:

- Healthcare and Hospitals.
- Data Centers and Information Technology.
- Manufacturing and Industrial Plants.
- Oil and Gas Sector.
- Telecommunications.
- Commercial Real Estate and Property Management.
- Construction and Engineering Firms.
- Governmental agencies and military installations.
- Marine and Shipping Industries.

Target Organizations Departments:

- Maintenance and Repair.
- Facilities Management.
- Engineering.
- Plant Operations.
- Health, Safety, and Environment (HSE).
- Technical Services.
- Capital Projects.
- Utilities Management.

Course Offerings:

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

- Identify the major components of a diesel generator set and explain their functions.
- Understand the fundamental principles of diesel engine operation and power generation.
- Perform routine preventative maintenance on diesel engine fuel, cooling, and lubrication systems.
- Read and interpret electrical schematics and wiring diagrams for generator systems.
- Operate and navigate generator control panels and automatic transfer switches (ATS).
- Implement safe start-up, shutdown, and load transfer procedures.
- Diagnose and troubleshoot common mechanical and electrical faults in generator sets.
- Conduct essential electrical tests and measurements for system verification.
- Develop a comprehensive preventative maintenance schedule based on industry best practices.
- Ensure compliance with key safety standards relevant to generator operation and maintenance.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to foster a deep, practical understanding of diesel generator systems through a blended learning approach. This course moves beyond traditional lectures, integrating interactive presentations with real-world case studies that challenge participants to solve complex operational and maintenance problems. Group discussions and collaborative workshops are central to the learning experience, allowing attendees to share insights and learn from the diverse experiences of their peers. Practical sessions will involve hands-on demonstrations and simulations of key procedures, such as navigating control panels and tracing circuits on electrical diagrams. Our expert instructors facilitate a dynamic environment where questions are encouraged, and active participation is key. Emphasis is placed on a problem-solving mindset, equipping participants not just with knowledge, but with the critical thinking skills required to diagnose and resolve issues effectively in the field. Continuous feedback is provided throughout the course to ensure concepts are thoroughly understood and skills are confidently applied.

Course Agenda (Course Units):

Unit One: Fundamentals of Diesel Generator Sets

- Introduction to Power Generation Principles.
- Key Components of a Genset: Engine, Alternator, Control Panel, and Base Frame.
- Understanding Diesel Engine Four-Stroke and Two-Stroke Cycles.
- The Role and Function of the Alternator and Voltage Regulator.
- Introduction to Electrical and Mechanical Safety Protocols.
- Review of Essential Tools and Personal Protective Equipment (PPE).
- Understanding Generator Ratings: Prime, Standby, and Continuous Power.

Unit Two: Diesel Engine Mechanical Systems

- The Diesel Fuel System: Tanks, Pumps, Filters, and Injectors.
- Engine Lubrication System: Oil Types, Pumps, Filters, and Coolers.
- Engine Cooling System: Radiators, Coolants, Water Pumps, and Thermostats.
- Air Intake and Exhaust Systems: Turbochargers, Air Filters, and Silencers.
- Routine Inspection and Maintenance of Mechanical Components.
- Engine Starting Systems: Batteries, Starters, and Charging Alternators.
- Basic Mechanical Troubleshooting for Non-Starting and Poor Performance Issues.

Unit Three: Generator Electrical Systems and Controls

- Principles of Alternator Operation and AC Power Generation.
- Deep Dive into the Automatic Voltage Regulator (AVR).
- Reading and Interpreting Electrical Schematics and Wiring Diagrams.
- Generator Control Panels: Components, Meters, and Alarms.
- The Automatic Transfer Switch (ATS): Function, Operation, and Testing.
- Generator Protection Systems: Overcurrent, Overvoltage, and Frequency Protection.
- Circuit Breakers and Switchgear Associated with Generator Sets.

Unit Four: Generator Operation and Load Management

- Pre-start Checks and Safe Start-up Procedures.
- Safe Shutdown Procedures for Normal and Emergency Situations.
- Monitoring Critical Parameters: Voltage, Frequency, Amperage, and Temperature.
- Understanding Generator Load Types and Power Factor.
- Manual and Automatic Load Transfer Procedures.
- Introduction to Generator Synchronization and Paralleling Concepts.
- Maintaining Operational Logs and Records.

Unit Five: Advanced Maintenance and Troubleshooting

- Developing a Comprehensive Preventative Maintenance Schedule.
- Systematic Troubleshooting of Electrical Faults.
- Systematic Troubleshooting of Mechanical Faults.
- Using Multimeters and Diagnostic Tools for Fault Finding.
- Introduction to Load Bank Testing: Purpose and Procedure.
- Vibration and Oil Analysis for Predictive Maintenance.
- Compliance with Industry Standards (e.g., NFPA 110).

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:

As generator technology integrates more with IoT and remote monitoring, how will the traditional role of the on-site maintenance technician evolve to encompass data analysis and predictive maintenance strategies?

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

This course distinguishes itself by offering a holistic and integrated curriculum that seamlessly merges the mechanical and electrical disciplines of generator maintenance. Unlike narrowly focused programs, it provides a comprehensive understanding of the entire genset as a single, cohesive system. The emphasis is placed on developing practical, real-world troubleshooting skills, moving beyond theoretical knowledge to empower participants with a systematic, logical approach to fault diagnosis. We explore not just the "how" but the "why" behind system failures, referencing established engineering principles. The content is meticulously structured to build knowledge progressively, from foundational concepts to advanced diagnostic techniques, ensuring a solid grasp of complex topics like control system logic and electrical schematic interpretation. Furthermore, the course content is aligned with current industry best practices and safety standards, such as NFPA 110, ensuring the skills learned are relevant, compliant, and immediately applicable in any professional setting requiring reliable power generation.