



**Energy, Electrical Engineering**



**SCANDINAVIAN ACADEMY**  
Training and Development

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# Course: Safe Operation & Maintenance of Circuit Breakers and Switchgears

Code	City	hotel	Start	End	price	Hours
581	Manama (Bahrain)	Hotel Meeting Room	2024-07-07	2024-07-11	2950 €	25

## Why Choose this Course?

This course will provide delegates a solid understanding on the safe use of circuit breakers, switchgears and associated equipment that requires correct initial selection, operation and maintenance. Strong emphasis on detailed understanding of how these devices should be installed, the local substation and system ratings, and how the various breakers operate; in order to enable accurate troubleshooting and subsequent repair.

On completion, delegates will be equipped or will have enhanced skills to ensure that circuit breakers and switchgear are installed, operated safely and maintained in a fashion that ensures safe and stable operation. Delegates will be exposed to recognize faults and ensure the underlying causes are identified to reduce possible further failures.

### This course will feature:

- Understanding the types and functions of circuit breakers
- Operation principle of medium voltage circuit breakers
- Identification of testing equipment and instruments
- Interpretation of single line drawings
- Troubleshooting and maintenance of switchgears

## What are the Goals?

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



- Understand the various types and operations of circuit breakers
- Determine the components and operations switchgears
- Explain the different types of testing instruments
- Analyse the common faults in an electrical installation
- Inculcate greater confidence, working safely on circuit breakers and switchgears

### Who is this Course for?

This course will benefit all levels of professional in an electrical installation. It will enable them to understand the importance of safe operations of circuit breakers and switchgears

**This course is suitable to a wide range of technical professionals but will greatly benefit:**

- Electricians
- Electrical supervisors
- Plant electricians
- Operations & maintenance engineers, supervisors & technicians
- Maintenance technicians

### How will this be Presented?

This course will utilise a variety of proven adult training techniques to ensure maximum understanding, comprehension and retention of the information presented. This includes presentation and discussion of latest videos and circuit breaker technologies.

Questions are encouraged throughout, particularly at the daily wrap up sessions. This provides opportunities for



participants to discuss with the Presenter specific issues and, if possible, find appropriate solutions. Specific goals of each participant will be discussed to ensure that their needs are fulfilled whenever practicable.

## **The Course Content**

### **Day One**

#### **The Technology of Circuit Breakers and Switchgear**

- Typical substation arrangements and motor control centres
- Motor and generator fault contributions
- Low, medium and high voltage equipment in an electrical installation
- Name plate ratings – interpretation
- CT's and VT's operation, construction and classifications
- Basic protection requirements

### **Day Two**

#### **Operation of various types of interrupting equipment**

- High voltage fuses and fused switches
- Moulded case circuit breakers
- Air and load break switches operation and construction
- Vacuum contactors applications



- Vacuum circuit breakers operations and characteristics
- SF6 circuit breakers types and operation principles

### **Day Three**

#### **The use of test equipment for operations and maintenance**

- Digital voltmeter (DVM), oscilloscope, insulation tester applications
- Temperature probes/ IR pyrometers
- Cable fault locators and techniques
- NEC check lists to ensure the correct installation
- Troubleshooting methodology for electrical equipment
- Group exercises and case studies

### **Day Four**

#### **The interpretation and use of drawings and job plan**

- Single-line electrical drawings control schematics
- Switchgear name plate information
- Logic and standard symbols



- Procedure preparation for fault finding
- Documentation and follow up safety procedures for switchgears
- Safety considerations and training

## **Day Five**

### **The identification and repair of problems/failures**

- Common mode failures in switchgears
- Phase imbalance and phase sequence effects
- Ground faults – cable and busbar faults
- A review of Safety Requirements
- Hazardous area classifications
- NEC electrical codes applications



**The Scandinavian Academy employs modern methods in training and skills development, enhancing the efficiency of human resource development. We follow these practices:**

- **Theoretical Lectures:**
  - We deliver knowledge through advanced presentations such as PowerPoint and visual materials, including videos and short films.
- **Scientific Assessment:**
  - We evaluate trainees skills before and after the course to ensure their progress.
- **Brainstorming and Interaction:**
  - We encourage active participation through brainstorming sessions and applying concepts through role play.
- **Practical Cases:**
  - We provide practical cases that align with the scientific content and the participants specific needs.
- **Examinations:**
  - Tests are conducted at the end of the program to assess knowledge retention.
- **Educational Materials:**
  - We provide both printed and digital scientific and practical materials to participants.
- **Attendance and Final Result Reports:**
  - We prepare detailed attendance reports for participants and offer a comprehensive program evaluation.
- **Professionals and Experts:**
  - The programs scientific content is prepared by the best professors and trainers in various fields.
- **Professional Completion Certificate:**
  - Participants receive a professional completion certificate issued by the Scandinavian Academy for Training and Development in the Kingdom of Sweden, with the option for international authentication.
- **Program Timings:**
  - Training programs are held from 10:00 AM to 2:00 PM and include buffet sessions for light meals during lectures.