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# Electrical Substation Design, Testing and Commissioning Procedure

25-27 June 2025  
Holiday Inn Hotel  
Sandton  
Johannesburg





# Electrical Substation Design, Testing and Commissioning Procedure

## WHY CHOOSE THIS TRAINING COURSE?

This highly-interactive training course will introduce you to the equipment that makes up an electric substation. It will explain how each type of equipment operates and guide you through the control and wiring diagrams that control equipment operation.

Recent technological developments have had tremendous impact on all aspects of substation design, operation, maintenance, safety, and grounding, testing and troubleshooting. A substation is a high – voltage electric system facility. It is used to switch generators, equipment, and circuits or lines in and out of a system. It is also used to change AC voltages from one level to another, and/or change alternating current to direct current or direct current to alternating current.

Knowledge of equipment condition allows you to target your maintenance efforts to reduce equipment failures and improve substation reliability. Applying predictive maintenance methods can reduce your costs and improve the performance of your maintenance program. This training course will show you methods and case studies that illustrate how to incorporate these new methods and testing techniques to improve reliability and optimize your existing maintenance program. You will study the latest testing technologies and how to apply them to determine the condition of oil and gas insulated transformers, circuit breakers, and other electrical equipment.

Electrical substation safety is an important issue in utility networks as well as large industrial installations and requires adequate attention in the stages of system planning, design, installation, operation and maintenance. In this training course, we will take a look at the theoretical aspects of safety as well as the practical and statutory issues.

### This training course will feature:

- Latest diagnostic testing techniques for assessing the condition of substation equipment such as transformers, circuit breakers, load tap changers, switches, and associated equipment
- Application of predictive diagnostic testing to reduce equipment failures and extend equipment life
- Aspects of safety as well as the practical and statutory issues
- Maintaining, testing, and inspection a proper grounding system for the electrical power substation

## WHAT ARE THE GOALS?

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

- **Design**, install, commission, test, operate, control and maintain HV/MV substations in a professional manner
- **Identify** the various types of substations covering its parts, equipment and major components
- **Recognize** over current protection for phase and earth faults as well as the recommended grading intervals
- **Employ** proper commissioning covering pre and cold commissioning, start-up, hot commissioning, start of production, performance test and acceptance of plant
- **Perform** testing procedures and basic calculations
- **Illustrate** medium voltage switchgear and oil circuit breakers

## WHO IS THIS TRAINING COURSE FOR?

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

- Those who are involved in the design, installation, commissioning, maintenance, testing, control and operation of electrical substation equipment
- Industrial, utility or plant engineers
- Maintenance supervisors
- Consulting engineers
- Electric utility engineers

## HOW WILL THIS TRAINING COURSE BE PRESENTED?

This training course will utilise a variety of proven adult learning techniques to ensure maximum understanding, comprehension and retention of the information presented. This includes lectures, workshops & work presentations, case studies & practical exercises, videos and software & simulators.

# THE COURSE CONTENT

## COURSE SCHEDULE:

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## THE CERTIFICATE

Luthando Skills Certificate of Completion for delegates who attend and complete the course.

### Day One: Types of Substations and Test Requirements

- Substations Parts & Equipment - Major Components
- Relay Connections
- Earth Fault Protection and Overcurrent Protection
- Transformers Function
- Test Instrument Calibration
- Test Equipment Used (Instrumentation & Control Systems in the Process)

### Substation Commissioning

- Pre-commissioning and Cold Commissioning
- Start-up and Hot Commissioning
- General Preparations before Acceptance of Plant
- Completion of Erection
- Mechanical Checks & Tests
- High Potential Testing Procedure

### Day Two: Substation Grounding Systems

- Reasons for Substation Grounding System
- Substation Earthing Calculation
- Components of a Substation
- Racking & Routing Installation Detail
- Panel Layout
- Megger Test

### Qualifications of Testing Organizational & Personnel

- Division of Responsibility
- Power System Studies
- Substation Control & Automation
- System Elements and Requirements
- HMI-Based and RTU-Based Topologies
- Substation Automation Functionality

### Basic Fault Calculations

- Need for Protection
- Faults, Types & Effects
- Simple Calculations of Short Circuits
- Medium Voltage Switchgear Circuit Breakers
- Air Blast, SF6 and Vacuum Circuit Breakers Operating Mechanisms
- Insulation Testing & Maintenance

# Electrical Substation Design, Testing and Commissioning Procedure

DATE	VENUE	FEES
25-27 June 2025	Sandton	R 8,999
REGISTER NOW		

\*This fee is inclusive of Documentation, Lunch and Refreshments

Complete & send by fax/mail to address given below.  
Please use **BLOCK CAPITALS**.

## REGISTRATION DETAILS

FAMILY NAME:

FIRST NAME:

POSITION:

COMPANY:

MAILING ADDRESS:

TELEPHONE:

MOBILE:

FAX:

EMAIL:

## AUTHORISATION

AUTHORISED BY:

POSITION:

EMAIL:

TELEPHONE:

FAX:

POSTAL ADDRESS:

## MODE OF PAYMENT

☐ PLEASE INVOICE MY COMPANY

☐ PLEASE INVOICE ME

## HOTEL ACCOMMODATION

Hotel accommodation is not included in the Registration Fee. A reduced corporate rate and a limited number of rooms are available for attendees wishing to stay at the hotel venue. Please make your request for accommodation at least 3 weeks prior to the commencement of the course.

## EVENT DISCLAIMER

We reserve the right to cancel or postpone a seminar or related event, change venue, substitution of the Instructor and alter the course content at our sole discretion. If this occurs, our responsibility is limited to a refund of any registration fee(s) already paid. We are not responsible for airline tickets, hotels costs, other tickets or payments, or any similar fee penalties or related or unrelated losses, costs and/or expenses registrant may incur or have incurred as a result of any trip cancellations or changes.

## CANCELLATION & SUBSTITUTION

You must notify the Registrar of cancellations at least 2 weeks before a scheduled seminar in order to be eligible for a credit. If you cannot attend, you may send a replacement from your organisation at no charge. There is a 50% handling charge for all cancellations or rescheduling. We reserve the right to cancel a seminar due to low enrollment. All registrants will be notified in advance and a full refund will be provided upon request.

## CERTIFICATION

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## 4 WAYS TO REGISTER

Telephone: + 27 87 808 2509

Cell Number: + 27 73 882 2609

Email Address: michael@luthandoskills.co.za

Visit our website: [www.luthandoskills.co.za](http://www.luthandoskills.co.za)