



cooperative  
governance

Department:  
Cooperative Governance  
REPUBLIC OF SOUTH AFRICA

## MUNICIPAL INFRASTRUCTURE SUPPORT AGENT (MISA)



CPD 2 Credits (SAIEE)

# Substation Design, Operation and Maintenance

The Municipal Infrastructure Support Agent (MISA) in partnership with SAICE Professional Development & Projects (SAICE-PDP) invites you to attend this 2-day course which covers the **basics of substation design, operation and maintenance.**



### Attend this course and learn about:

- The South African power system
- Asset creation process
- South African Grid Code requirements for substation design and operation
- Substation busbar arrangements
- Major substation equipment: Instrument transformers, switchgear, power transformers, reactive compensation equipment, auxiliary supplies
- Substation earthgrid design
- Lightning protection system design
- Substation inspections

### After attending this course, you will have gained knowledge and insight into:

- Substation primary plant design
- Substation earthgrid and lightning protection system design
- Substation Inspections and maintenance
- Troubleshooting equipment failures

### Presenter:

Nompumelelo Bofu Pr. Eng, Pr. CPM

### COURSE SCHEDULE

Venue:

Dates:

Time:

### REGISTRATION

To register, visit [www.saicepdp.org](http://www.saicepdp.org)

For more details contact Nompumelelo Nyaba:

Email [nompumelelo@saicepdp.org](mailto:nompumelelo@saicepdp.org) /

Tel: 011 476 4100

### WHO SHOULD ATTEND

This course is recommended for:

- Planning and Projects Engineers and Technologists
- Operations and Maintenance Engineers and Technologists

## COURSE OUTLINE – DAY 1

### SESSION 1 – OVERVIEW OF THE SOUTH AFRICAN POWER SYSTEM

- Overview of the South African power system
- Asset creation process
- Overview of the South African Grid Code
- Substation overview

### SESSION 2 – SUBSTATION DESIGN

- Substation site selection
- Substation busbar arrangements
- Substation earthgrid design
- Substation lightning protection system design
- Substation fire containment

## COURSE OUTLINE – DAY 2

### SESSION 1 – MAJOR EQUIPMENT

- Selection of major equipment
- Power transformers
- Instrument transformers
- Switchgear
- Auxiliary supplies

### SESSION 2 – SUBSTATION DESIGN REVIEWS

- Review of substation equipment arrangement
- Review of equipment selection
- Review of applicable standards

### SESSION 3 – SUBSTATION CONSTRUCTION, INSPECTION AND MAINTENANCE

- Construction supervision for substation projects
- Substation terrace inspections
- Substation major equipment inspections
- Substation earthgrid inspections
- Auxiliary supply equipment inspections
- Tests on major equipment



SAICE-PDP's Municipal Academy was established to support practitioners employed in local government with applying theoretical knowledge and relevant legislation in practice.

## CHECKLISTS INCLUDED

### QUALITY CHECKLIST FOR DISTRIBUTION SUBSTATION PRIMARY PLANT PRIOR TO HANDING OVER FOR COMMERCIAL OPERATION

- General project information
- Tracking page
- Design package handover documentation
- Civil works: *platform; control building; subsoil drainage; equipment foundations & cable trenches; roads, kerbing; transformer bund wall, oil dam and fire wall*
- Steelwork
- Fencing
- Power transformer delivery & assembly
- Primary equipment Installation
- Conductors, busbars & clamps
- Provisional handover
- Final handover

### TRANSFORMER HANDOVER CHECKLIST

- Receipt of transformer and dressing
- Oil filling and oil levels
- Breathers – tap changer and transformer
- Auxiliaries
- Cooling system
- Bushings
- On-load tap changer and marshalling kiosk
- General

### SUBSTATION DESIGN REVIEW CHECKLIST

- Busbar material selection
- Stringers and droppers
- Substation clamps
- Earthmat design
- Switchgear selection
- Cable sizing
- Auxiliary transformer sizing
- Battery and battery charger
- Instrument transformers (voltage and current)
- Surge arrestors
- Power transformers
- Control building small power and lighting
- Yard small power and lighting
- Integrated security system
- Control building cable routing and layout
- Lightning protection
- AC and DC distribution boards



**municipal academy**  
the road to service delivery



MISA's mandate is to provide technical support and advice to municipalities, whilst strengthening their capacity, for effective infrastructure planning, delivery, operations and maintenance.