



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: Online via Zoom

Dates: 08-09 September 2025

Time: 08:30 for 09:00 to 16:30

REGISTRATION

To register, visit www.saicepdp.org

For more details contact Phathi Masimirembwa:

Email phathi@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.