

GOVERNMENT NOTICES

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

No. 977

6 October 2006



SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

In accordance with regulation 24(c) of the Regulations of 28 March 1998, the Standards Generating Body (SGB) for


Power Plant Operations

Registered by Organising Field 06, Manufacturing, Engineering and Technology, publishes the following qualification and unit standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the qualification and unit standard. The qualification and unit standard can be accessed via the SAQA web-site at www.saga.org.za. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, Hatfield Forum West, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the qualification and unit standards should reach SAQA at the address **below and no later than 5 November 2006**. All correspondence should be marked **Standards Setting – SGB for Power Plant Operations** and addressed to

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SAQA QUAL ID	QUALIFICATION TITLE		
57693	National Diploma: Electrical Network Power Dispatch Controlling		
NAME	ORGANISING FIELD ID	PROVIDER NAME	
SGB Power Plant Operations	6		
QUAL TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD	
National Diploma	Manufacturing, Engineering and Technology	Engineering and Related Design	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUALIFICATION CLASS
Undefined	240	Level 5	Regular-Unit Stds Based

PURPOSE AND RATIONALE OF THE QUALIFICATION

Purpose:

Learners that obtain the qualification will perform operational activities on national electrical networks and related systems. The qualification will ensure professionalism, proficiency and excellence for controlling the dispatch of power in electrical networks.

Qualifying learners would be able to:

- > Perform load dispatch operations.
- > Explain and apply the fundamentals of power dispatch and electrical systems engineering concepts.
- > Interpret and explain regulatory requirements.
- > Explain and apply power plant engineering concepts.

Rationale:

Electrical load dispatchers control power generation capacities and manage the electrical network power demands.

This qualification is based on industry needs for building competencies in the workplace for people working in the Electrical Network Power Dispatch Operations. This qualification provides the learner with accessibility to be employed within the Electrical Power Generation, Transmission, Distribution and related industries.

The National Diploma in Electrical Power Dispatch Controlling: NQF Level 5 is an initiative from Eskom Transmission division in an attempt to give recognition through an NQF qualification for operators functioning in the field of electrical network control.

The qualification covers the following fields for electrical system control:

- > Local control centre network control operations.
- > Regional control centre network control operations.
- > National control centre network control operations.

The qualification will provide the foundational requirements for mobility and vertical progression in national and international Electrical Power Utilities. This qualification provides the learner with the flexibility to pursue different careers in the electrical power generation, transmission and related industries associated with local, regional and national electrical grid control. Areas of activity for learners include the fields of process engineering, functional supervision, system specialisation, quality assurance and health and safety.

Other considerations of national interest addressed by this qualification are:

- > Setting national standards of practice in electrical network power dispatch operations.
- > Building individual capacity in foundational operating competence.
- > Ensuring entry, progression and mobility into life long learning in this specific learning field.
- > Addressing the national electrical transmission control specific employment requirements.
- > Providing access for the previously disadvantaged into this discipline.
- > Providing a qualification to be used in a learnership in this field.
- > Enhancing social and economic development.

This qualification will provide for recognition of prior learning of existing electrical network power dispatch controllers and allow credits to be obtained in cross-functional learning fields. This qualification will provide the foundational requirements for mobility and vertical progression in national and international electrical power utilities.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

It is assumed that learners are already competent in:

- > Communication and Mathematical Literacy at NQF Level 4.

Recognition of prior learning:

This qualification will be achieved in part or in full through recognition of prior learning. Any other evidence of prior learning should be assessed through formal RPL processes to recognise achievement thereof.

Access to the Qualification:

Access to this qualification is open. However, it is preferable that learners are already competent in electrical heavy current or electrical network control at NQF Level 4.

QUALIFICATION RULES

- > All the fundamental unit standards totalling 23 credits are compulsory.
- > All the core unit standards totalling 173 are compulsory.
- > A minimum of 44 credits should be chosen from the elective component of the qualification.

A minimum of 240 credits is required to obtain the qualification.

EXIT LEVEL OUTCOMES

1. Explain and apply the fundamentals of Power Dispatch and Electrical Systems Engineering concepts.
 2. Perform load dispatch operations.
 3. Explain and apply power plant engineering concepts.
 4. Interpret and explain regulatory requirements.
- > Range: Includes Regulatory knowledge (High Voltage Regulations and National Key Points)/Integrated electrical system control environment.

Critical Cross Field Outcomes:

This qualification addresses the following critical cross-field outcomes, as detailed in the assessment criteria for each exit level outcome and within the unit standards associated with each exit level outcome:

- > Identifying and solving problems related to load dispatch operations.
- > Working effectively with others as a member of a team, when balancing integrated electrical network supply and demand requirements.
- > Organising and managing oneself and one's activities within an electrical network control environment.
- > Collecting, analysing, organising and critically evaluating information when performing load dispatch operations.
- > Communication on an interconnected power system, and with other team or supervisory members.
- > Using electronic information systems in the control of integrated electrical network.
- > Understand regulatory requirements and how they apply to plant and people.

ASSOCIATED ASSESSMENT CRITERIA

1.

- > Electrical systems engineering concepts are explained and applied within the context of electrical power dispatch operations.
 - > Range: Explanations cover national and international integrated electrical networks, electrical power transmission functions, effective operation of electrical networks and usage of established literature or engineering conventions.
- > Electrical equipment design and application theories are explained and applied within the context of their application.
- > Effects of system failures and constraints on system frequency and voltage are explained within the context of their application.

2.

- > Electrical systems engineering concepts are explained and applied within the context of electrical power dispatch operations.
 - > Range: Explanations cover national and international integrated electrical networks, electrical power transmission functions, effective operation of electrical networks and usage of established literature or engineering conventions.
- > Electrical equipment design and application theories are explained and applied within the context of their application.
- > Effects of system failures and constraints on system frequency and voltage are explained within the context of their application.

3.

- > Power plant engineering concepts are explained and applied within the context of plant operations.
- > Concepts related to safe and effective operation of plant processes are explained in accordance with specified requirements.
- > Power plant systems are explained in accordance with requirements.
- > Operating philosophy of steam generator systems is explained in accordance with requirements.

4.

- > Regulatory requirements in workplace procedures are interpreted and explained within the context of the Occupational Health and Safety Act.
- > Non-compliance to statutory requirements and system operating guidelines is explained in terms of the potential impact on the macro environment.
- > Interrelations between related regulatory requirements, system operating guidelines and power pool rules are explained in accordance with specified requirements.
- > Safety principles are explained as they apply to power plant and people.
- > Operating regulations for high voltage systems are explained and applied within an electrical system control environment.
- > Power contracts and agreements are explained within the context of electrical network load dispatch are explained within a context.
 - > Range: Southern African power contracts and agreements.

Integrated Assessment:

The applied competence (practical, foundational and reflexive competencies) of this qualification will be achieved if a learner is able to achieve all exit level outcomes of the qualification as per the rules specified. Applicable critical cross-field outcomes must be assessed during any combination of practical, foundational and reflexive Competencies. Assessment methods and tools used must determine the whole person's development and integration of applied knowledge and skills.

- > Certain exit level outcomes are measurable and verifiable through assessment criteria assessed in one application.
- > Applicable assessment tools to assess the foundational, reflexive and practical competencies within the electrical network environment.
- > A detailed portfolio of evidence is required of the practical, foundational and reflective competencies of the learner.
- > Assessors and moderators should develop and conduct integrated assessment by making use of a range of formative and summative methods. Assessors should assess and give credit for the evidence of learning that has already been acquired by recognition of prior learning (RPL) through any form of learning.
- > Unit standards associated with this qualification must be used to assess specific and critical cross -field outcomes. During integrated assessment, the assessor should make use of formative and summative assessment methods and should assess combinations of practical, foundational and reflective competencies.

Formative assessment:

Assessment criteria for formative assessment are described in the various unit standards. Formative assessment takes place during the process of learning and assessors should use a range of appropriate assessment methods and tools that assess competence holistically. These methods include but are not limited to the following:

- > On-the-job observations.
- > Role-play and/or simulations.
- > Knowledge tests, examinations, case studies, projects, logbooks, workbooks.
- > Verbal report backs (presentations).
- > Portfolios of evidence (RPL).
- > Working in teams (360 degrees evaluations).
- > Scenario sketching.
- > Incident reports.

The assessment tools and methods used by the assessor must be:

- > Fair, not to hinder or disadvantage the learner in any way.
- > Valid, to measure what is intended to measure.
- > Reliable, consistent and delivers the same output across a range of learners and assessors.

Summative assessment:

Summative assessment is carried out at the end of each meaningful competence level achieved by the learner. A detailed portfolio of evidence is required to prove the practical, foundational and reflective competencies of the learner.

INTERNATIONAL COMPARABILITY

A detailed study was done by members of the Power Plant Operations SGB in Australia (AQF) and New Zealand (NZQA) in December 2003. The proposed qualification for power transmission and network control compares favourably with their qualification authorities. In above countries the qualifications for electrical grid controllers are still under development, South Africa is currently at the forefront of qualification development in this field.

Development of the South African qualifications took cognisance of developments within the Canadian training environment, as well as the organisational structure in all mentioned countries. Attempts to benchmark within the African context concluded that South Africa produces approximately **65%** of all power generated in Africa. Electrical system controllers of the following countries within Africa are trained at the South African National Control Centre in Simmerpan Germiston. (Namibia, Swaziland, Lesotho, Mali, Mozambique, Botswana, Zimbabwe and Zambia.)

International Benchmark Matrix: Electrical Network System Operations/Control and how the best practice was incorporated into this qualification:

SA:

- > Utility: Electrical Network Systems Control.
- > Roles: Electrical Load Dispatcher/Voltage Control and System Outage management.
- > Framework levels: 1-8.
- > NQF levels: 4-6.
- > Credits: 980.
- > Accreditation/Quality assurance: ESETA.
- > Entry level requirements: NQF 4.
- > Operators in fields: 614.
- > Number of unit standards: ±186.

NZ:

- > Utility: Electrical Network Systems Control.
- > Roles: Electrical Load Dispatcher/Voltage Control and System Outage management.
- > Framework levels: 1-10.
- > NQF levels: Under development.
- > Accreditation/Quality assurance: NZQA.
- > Entry level requirements: NZQA 3.

AUS:

- > Utility: Electrical Network Systems Control.
- > Roles: Electrical Load Dispatcher/ Voltage Control and System Outage management.
- > Framework levels: 1-10.
- > NQF levels: Under development.
- > Accreditation/Quality assurance: AQF.
- > Entry level requirements: AQF 3.

Canada:

- > Utility: Electrical Network Systems Control.
- > Roles: Electrical Load Dispatcher/Voltage Control and System Outage management.

The following information based on the matrix:

- > Roles: Electrical load dispatchers control power generation capacities and manage the electrical network power demands. (System Frequency Control).
- > Framework: Qualifications obtained in this learning field for electrical system controllers consist of one certificate, two diplomas and a proposed B Tech degree.
- > Operators in field: This figure represents system controllers in local, regional and national electrical control centres.

From the comparability study undertaken, it can be concluded that this qualification compares favourably with one done internationally.

ARTICULATION OPTIONS

This qualification provides the learner with the flexibility to pursue different careers in the Electrical Power Generation, Transmission and related industries.

Horizontal Articulation:

National Diploma in Electrical System Outage Controlling: NQF Level 5.

Vertical Articulation:

B Tech: Electrical Network Management: NQF Level 6.

MODERATION OPTIONS

> Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with the relevant ETQA.

> Any institution offering learning that will enable the achievement of this Qualification must be accredited as a provider with the relevant ETQA.

> Assessment and moderation of assessment will be overseen by the relevant ETQA according to the ETQA'S policies and guidelines for assessment and moderation; in terms of agreements reached around assessment and moderation between ETQA'S (including professional bodies); and in terms of the moderation guideline detailed immediately below.

> Moderation must include both internal and external moderation of assessments at exit points of the qualification. Moderation should also encompass achievement of the competence described both in individual unit standards, exit level outcomes as well as the integrated competence described in the qualification.

> A learner wishing to be assessed for this Qualification can only be assessed through an accredited assessment provider or centre.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

The assessor must:

- > Preferably be in possession of a relevant qualification at NQF Level 6 or higher.
- > Have at least two years relevant workplace experience.
- > Be registered as an assessor with the relevant ETQA.

NOTES

N/A

UNIT STANDARDS*(Note: A blank space after this line means that the qualification is not based on Unit Standards.)*

	UNIT STANDARD ID AND TITLE	LEVEL	CREDITS	STATUS
core	10689 Understand electrical protection systems associated with power generating processes	Level 4	6	Registered
core	116407 Control frequency and voltages in an islanding condition on electrical networks	Level 4	6	Registered
core	242752 Demonstrate knowledge and understanding of the integrated Electrical System control work environment	Level 4	4	Draft - Prep for P Comment
core	242755 Demonstrate knowledge and understanding of power plant auxiliary systems	Level 4	9	Draft - Prep for P Comment
core	242758 Describe the operating philosophy of steam generator plant systems	Level 4	9	Draft - Prep for P Comment
core	242769 Describe the operating philosophy of steam driven turbo-generator plant systems	Level 4	9	Draft - Prep for P Comment
core	14041 Demonstrate Knowledge and Understanding of the Electrical Technology Associated with the Control of Electrical Energy on a Power Generating Unit in the Power Plant	Level 5	6	Registered
core	242750 Reschedule surplus power generation capacity on national and international electrical transmission systems	Level 5	15	Draft - Prep for P Comment
core	242754 Demonstrate knowledge and understanding of system frequency and tie-line control.	Level 5	4	Draft - Prep for P Comment
core	242757 Know and understand power dispatch on an electrical interconnected system	Level 5	4	Draft - Prep for P Comment
core	242759 Describe power dispatch under deregulation on the electrical interconnected power system	Level 5	4	Draft - Prep for P Comment
core	242760 Perform remote operations from an electronic management system on hydro and gas driven power generating plant	Level 5	9	Draft - Prep for P Comment
core	242762 Demonstrate knowledge and understanding of communication on electrical interconnected power system	Level 5	4	Draft - Prep for P Comment
core	242763 Reschedule active power generation shortages on national and international electrical transmission systems	Level 5	15	Draft - Prep for P Comment
core	242766 Demonstrate knowledge and understanding of operating regulations for high voltage systems	Level 5	8	Draft - Prep for P Comment
core	242767 Commission power plant generating units onto the electrical integrated network	Level 5	11	Draft - Prep for P Comment
core	242772 Demonstrate knowledge and understanding of Southern African power contracts and agreements related to electrical network load dispatch	Level 5	17	Draft - Prep for P Comment
core	242775 Perform load following on electrical transmission systems	Level 5	15	Draft - Prep for P Comment
core	242776 Maintain the quality of power supply in terms of frequency on electrical transmission systems	Level 5	18	Draft - Prep for P Comment
Elective	14045 Apply Transformational Leadership by Interacting with Key Stakeholders	Level 4	8	Registered
Elective	116434 Control electrical networks from a control centre	Level 4	10	Registered
Elective	116453 Perform operations on high voltage integrated systems	Level 4	4	Registered
Elective	120377 Identify, suggest and implement corrective actions to improve quality of project work	Level 4	7	Registered
Elective	14047 Apply Sound Management Practices in Order to Achieve Short to Mid Term Objectives	Level 5	10	Registered
Elective	115402 Assist in researching the problem and the solution within a consulting context	Level 5	6	Registered
Elective	242770 Demonstrate knowledge and understanding of electrical network layout and configuration	Level 5	18	Draft - Prep for P Comment
Elective	242773 Describe the implication of electrical system control changes on the electrical interconnected power system	Level 5	4	Draft - Prep for P Comment
Elective	242761 Know and understand system security on the electrical network interconnected system	Level 6	4	Draft - Prep for P Comment
Elective	242765 Know and understand system operations under abnormal conditions on interconnected electrical networks	Level 6	4	Draft - Prep for P Comment
Elective	242768 Demonstrate knowledge of power system voltage control	Level 6	4	Draft - Prep for P Comment
Elective	242771 Know and understand system restoration on the interconnected electrical networks	Level 6	4	Draft - Prep for P Comment
Fundamental	242753 Know and understand the operation of Electrical Power Transmission functions	Level 5	4	Draft - Prep for P Comment
Fundamental	242764 Demonstrate knowledge of power system fundamentals	Level 5	4	Draft - Prep for P Comment

Fundamental	242774 Operate Electronic Information Systems used in the control of an integrated Electrical Network	Level 5	15	Draft - Prep for P Comment
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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

1

SAQA US ID	UNIT STANDARD TITLE		
242750	Reschedule surplus power generation capacity on national and international electrical transmission systems		
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME	
SGB Power Plant Operations	6		
UNIT STANDARD TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION	
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design	
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
			Regular

SPECIFIC OUTCOME 1

Monitor system for surplus power generation capacity from Schedule Program.

SPECIFIC OUTCOME 2

Reschedule surplus power generation capacity.

SPECIFIC OUTCOME 3

Implement surplus power generation capacity rescheduled program.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

2

Demonstrate knowledge and understanding of the integrated Electrical System control work environment

<i>SAQA US ID</i>	<i>UNIT STANDARD TITLE</i>		
242752	Demonstrate knowledge and understanding of the integrated Electrical System control work environment		
<i>SGB NAME</i>		<i>ORGANISING FIELD ID</i>	<i>PROVIDER NAME</i>
SGB Power Plant Operations		6	
<i>UNIT STANDARD TYPE</i>		<i>ORGANISING FIELD DESCRIPTION</i>	<i>SUBFIELD DESCRIPTION</i>
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
<i>ABET BAND</i>	<i>CREDITS</i>	<i>NQF LEVEL</i>	<i>UNIT STANDARD TYPE</i>
Undefined	4	Level 4	Regular

SPECIFIC OUTCOME 2

Demonstrate knowledge of workplace environment.

SPECIFIC OUTCOME 3

Demonstrate knowledge of personal hygiene and health.

SPECIFIC OUTCOME 4

Explain organisation business principles.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

3

SAQA US ID	UNIT STANDARD TITLE		
242753	Know and understand the operation of Electrical Power Transmission functions		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	4	Level 5	Regular

SPECIFIC OUTCOME 1

Explain transmission lines and cables.

SPECIFIC OUTCOME 2

Demonstrate knowledge of transmission line characteristics.

SPECIFIC OUTCOME 3

Define transmission line compensation.

SPECIFIC OUTCOME 4

Explain substation equipment.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

4

Demonstrate knowledge and understanding of system frequency and tie-line control.

SAQA US ID	UNIT STANDARD TITLE		
242754	Demonstrate knowledge and understanding of system frequency and tie-line control.		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	4	Level 5	Regular

SPECIFIC OUTCOME 1

Explain electrical frequency concepts.

SPECIFIC OUTCOME 2

Explain primary control and frequency.

SPECIFIC OUTCOME 3

Describe frequency dynamics and tie-line control.

SPECIFIC OUTCOME 4

Explain automatic governor control.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

5

SAQA US ID	UNIT STANDARD TITLE	
242755	Demonstrate knowledge and understanding of power plant auxiliary systems	
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations	6	
UNIT STANDARD TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND (CREDITS)	NQF LEVEL	UNIT STANDARD TYPE
	4	

SPECIFIC OUTCOME 1

Explain **coal** plant operational principles.

SPECIFIC OUTCOME 2

Describe compressor plant operating principles.

SPECIFIC OUTCOME 3

Explain fuel oil plant operating principles.

SPECIFIC OUTCOME 4

Describe ash plant operating philosophy.

SPECIFIC OUTCOME 5

Explain **CW** plant operating philosophy.

SPECIFIC OUTCOME 6

Explain water purification plant operating philosophy.

SPECIFIC OUTCOME 7

Explain hydrogen production plant operating philosophy.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

SAQA US ID	UNIT STANDARD TITLE	
242757	Know and understand power dispatch on an electrical interconnected system	
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations	6	
UNIT STANDARD TYPE	FIELD	DESCRIPTION
Regular	Electrical Engineering and Technology	Engine and Related Design
BAND	NQF LEVEL	UNIT STANDARD TYPE
Undefined	Level 5	Similar

SPECIFIC OUTCOME 1

Describe scheduling of power generation.

SPECIFIC OUTCOME 2

Explain the order of power dispatch.

SPECIFIC OUTCOME 3

Explain transmission equipment constraints.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

7

Describe the operating philosophy of steam generator plant systems

SAQA US ID	UNIT STANDARD TITLE		
242758	Describe the operating philosophy of steam generator plant systems		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	9	Level 4	Regular

SPECIFIC OUTCOME 1

Describe steam generator layout and design.

SPECIFIC OUTCOME 2

Explain operating philosophy of the main systems of a steam generator.

SPECIFIC OUTCOME 3

Explain operation of steam generator auxiliary systems.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

8

SAQA US ID	UNIT STANDARD TITLE		
242759	Describe power dispatch under deregulation on the electrical interconnected power system		
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME	
SGB Power Plant Operations	6		
UNIT STANDARD TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION	
Regulatory	Manufacturing Engineering and Technology	Engineering and Technology	
ABET BAND	LEVEL	UNIT STANDARD TYPE	
4	Level 5	Regulatory	

SPECIFIC OUTCOME 1

Describe competitive market transactions.

SPECIFIC OUTCOME 2

Describe generation scheduling and ancillary services.

SPECIFIC OUTCOME 3

Explain real time dispatch.

SPECIFIC OUTCOME 4

Describe dispatch under emergency conditions.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

9

SAQA US ID	UNIT STANDARD TITLE		
242760	Perform remote operations from an electronic management system on hydro and gas driven power generating plant		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	9	Level 5	Regular

SPECIFIC OUTCOME 1

Perform remote operations on hydro driven power generating plant.

SPECIFIC OUTCOME 2

Perform remote operations on Gas Turbine power generating plant.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

10

Know and understand system security on the electrical network interconnected system

SAQA US ID	UNIT STANDARD TITLE		
242761	Know and understand system security on the electrical network interconnected system		
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME	
SGB Power Plant Operations	6		
UNIT STANDARD TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION	
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design	
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	4	Level 6	Regular

SPECIFIC OUTCOME 1

Describe interconnected power flow.

SPECIFIC OUTCOME 2

Explain transmission line loadability.

SPECIFIC OUTCOME 3

Know equipment limitations and security monitoring.

SPECIFIC OUTCOME 4

Describe methods of improving system security.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

11

Demonstrate knowledge and understanding of communication on electrical interconnected power system

SAQA US ID	UNIT STANDARD TITLE		
242762	Demonstrate knowledge and understanding of communication on electrical interconnected		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	4	Level 5	Regular

SPECIFIC OUTCOME 1

Explain transmission system communication.

SPECIFIC OUTCOME 2

Describe the use of supervisory control and data acquisition.

SPECIFIC OUTCOME 3

Understand the master information processing station.

SPECIFIC OUTCOME 4

Demonstrate an understanding of SCADA installation and maintenance features.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

12

SAQA US ID	UNIT STANDARD TITLE	
242763	Reschedule active power generation shortages on national and international electrical transmission systems	
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations	6	
UNIT STANDARD TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND (CREDITS)	NQF LEVEL	UNIT STANDARD TYPE
15		

SPECIFIC OUTCOME 1

Determine power generation shortages from scheduled program.

SPECIFIC OUTCOME 2

Reschedule active power generation demand.

SPECIFIC OUTCOME 3

Implement power generation shortages rescheduled program.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

13

SAQA US ID	UNIT STANDARD TITLE		
242764	Demonstrate knowledge of power system fundamentals		
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME	
SGB Power Plant Operations	6		
UNIT STANDARD TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION	
	5		

SPECIFIC OUTCOME 1

Describe power system fundamentals

SPECIFIC OUTCOME 2

Explain effects of resistance, capacitance, and inductance on an electrical power system.

SPECIFIC OUTCOME 3

Describe Power factor and power factor correction on a power system.

SPECIFIC OUTCOME 4

Explain effects of impedance and voltage drop on the power system.

SPECIFIC OUTCOME 5

Describe three phase power systems.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

14

Know and understand system operations under abnormal conditions on interconnected electrical networks

SAQA US ID	UNIT STANDARD TITLE		
242765	Know and understand system operations under abnormal conditions on interconnected electrical networks		
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME	
SGB Power Plant Operations	6		
UNIT STANDARD TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION	
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design	
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	4	Level 6	Regular

SPECIFIC OUTCOME 1

Demonstrate an understanding of operating state and design processes.

SPECIFIC OUTCOME 2

Describe generation deficient conditions.

SPECIFIC OUTCOME 3

Demonstrate an understanding of islanding conditions.

SPECIFIC OUTCOME 4

Explain abnormal voltage conditions.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

15

Demonstrate knowledge and understanding of operating regulations for high voltage systems

<i>SAQA US ID</i>	<i>UNIT STANDARD TITLE</i>		
242766	Demonstrate knowledge and understanding of operating regulations for high voltage systems		
<i>SGB NAME</i>		<i>ORGANISING FIELD ID</i>	<i>PROVIDER NAME</i>
SGB Power Plant Operations		6	
<i>UNIT STANDARD TYPE</i>		<i>ORGANISING FIELD DESCRIPTION</i>	<i>SUBFIELD DESCRIPTION</i>
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
<i>ABET BAND</i>	<i>CREDITS</i>	<i>NQF LEVEL</i>	<i>UNIT STANDARD TYPE</i>
Undefined	8	Level 5	Regular

SPECIFIC OUTCOME 1

Describe the regulatory requirements for access to and supervision in prohibited and or restricted areas.

SPECIFIC OUTCOME 2

Demonstrate knowledge and understanding of regulatory requirements for operating, earthing and work permit.

SPECIFIC OUTCOME 3

Explain regulatory requirements for abnormal and special working conditions.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

16

Commission power plant generating units onto the electrical integrated network

SAQA US ID	UNIT STANDARD TITLE		
242767	Commission power plant generating units onto the electrical integrated network		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	11	Level 5	Regular

SPECIFIC OUTCOME 1

Prepare for commissioning of power generating unit.

SPECIFIC OUTCOME 2

Commission power generating unit.

SPECIFIC OUTCOME 3

Monitor commissioning of power generating unit.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

17

Demonstrate knowledge of power system voltage control

SAQA US ID	UNIT STANDARD TITLE		
242768	Demonstrate knowledge of power system voltage control		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	4	Level 6	Regular

SPECIFIC OUTCOME 1

Explain MVAR supply and demand.

SPECIFIC OUTCOME 2

Describe the effect of line loadings on VARs and voltage.

SPECIFIC OUTCOME 3

Explain characteristics and effects of line Surge Impedance Loading (SIL).

SPECIFIC OUTCOME 4

Explain generating plant voltage control equipment and methods.

SPECIFIC OUTCOME 5

Explain transmission voltage control equipment and methods.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

SAQA US ID	UNIT STANDARD TITLE		
242769	Describe the operating philosophy of steam driven turbo-generator plant systems		
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME	
SGB Power Plant Operations	6		
UNIT TITLE	ORG	FIELD DESCRIPTION	UNIT DESCRIPTION
Relevant	Manufacturing Engineering		Engineering Related
ABET BAND	CREDITS	NQF LEVEL	UNIT STATUS TYPE
Undefined		Level 4	

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SPECIFIC OUTCOME 2

Explain operating philosophy of the main systems of a turbo generator.

SPECIFIC OUTCOME 3

Explain operation of turbo generator auxiliary systems,



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

19

Demonstrate knowledge and understanding of electrical network layout and configuration

SAQA US ID	UNIT STANDARD TITLE		
242770	Demonstrate knowledge and understanding of electrical network layout and configuration		
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME	
SGB Power Plant Operations	6		
UNIT STANDARD TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION	
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design	
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	18	Level 5	Regular

SPECIFIC OUTCOME 1

Demonstrate knowledge and understanding of electrical network layout and configuration philosophy.

SPECIFIC OUTCOME 2

Interpret emergency electrical supply plans.

SPECIFIC OUTCOME 3

Explain regulatory requirements to operate and work on electrical apparatus.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

20

Know and understand system restoration on the interconnected electrical networks

SAQA US ID	UNIT STANDARD TITLE		
242771	Know and understand system restoration on the interconnected electrical networks		
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME	
SGB Power Plant Operations	6		
UNIT STANDARD TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION	
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design	
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	4	Level 6	Regular

SPECIFIC OUTCOME 1

Describe a blackout condition and prepare for restoration.

SPECIFIC OUTCOME 2

Explain re-energising the transmission system and black starting.

SPECIFIC OUTCOME 3

Describe cold load pick-up.

SPECIFIC OUTCOME 4

Explain generation loading and frequency control.

SPECIFIC OUTCOME 5

Describe voltage control during restoration.

SPECIFIC OUTCOME 6

Describe organising for rapid recovery.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

21

SAQA US ID	UNIT STANDARD TITLE	
242772	Demonstrate knowledge and understanding of Southern African power contracts and agreements related to electrical network load dispatch	
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations	6	
UNIT STANDARD TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND (CREDITS)	NQF LEVEL	UNIT STANDARD TYPE
	Level 5	

SPECIFIC OUTCOME 1

Demonstrate knowledge and understanding of international contracts and agreements.

SPECIFIC OUTCOME 2

Explain philosophies related to system operating guidelines and operating procedures.

SPECIFIC OUTCOME 3

Demonstrate knowledge of Southern African Power Pool agreements and market rules.

SPECIFIC OUTCOME 4

Explain ancillary services.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

22

SAQA US ID	UNIT STANDARD TITLE		
242773	Describe the implication of electrical system control changes on the electrical interconnected power system		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	4	Level 5	Regular

SPECIFIC OUTCOME 1

Understand the participation of organisations providing electrical energy.

SPECIFIC OUTCOME 2

Describe the availability of power transfer capability.

SPECIFIC OUTCOME 3

Explain contracting of power and energy.


SOUTH AFRICAN QUALIFICATIONS AUTHORITY

SAQA US ID	UNIT STANDARD TITLE		
242774	Operate Electronic Information Systems used in the control of an integrated Electrical Network		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	15	Level 5	Regular

SPECIFIC OUTCOME 1

Access relevant Electronic Information Systems.

SPECIFIC OUTCOME 2

Utilise relevant Electronic Information Systems.

SPECIFIC OUTCOME 3

Identify Electronic Information Systems malfunctions.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

24

SAQA US ID	UNIT STANDARD TITLE		
242775	Perform load following on electrical transmission systems		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	15	Level 5	Regular

SPECIFIC OUTCOME 3

Control abnormal system conditions.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

25

Maintain the quality of power supply in terms of frequency on electrical transmission systems

SAQA US ID	UNIT STANDARD TITLE		
242776	Maintain the quality of power supply in terms of frequency on electrical transmission systems		
SGB NAME		ORGANISING FIELD ID	PROVIDER NAME
SGB Power Plant Operations		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	18	Level 5	Regular

SPECIFIC OUTCOME 1

Implement SAPP tie-line hourly contracts.

SPECIFIC OUTCOME 2

Perform loading according to Area Control Error (ACE).

SPECIFIC OUTCOME 3

Monitor tie-line power flow.

SPECIFIC OUTCOME 4

Control abnormal system conditions.