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## GOVERNMENT NOTICE

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### SOUTH AFRICAN QUALIFICATIONS AUTHORITY

No. 1076

23 November 2007



#### SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

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

#### Electronics

registered by Organising Field 10, Physical, Mathematical, Computer and Life Sciences, 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 Standards. The full Qualification and Unit Standards can be accessed via the SAQA web-site at [www.saqqa.org.za](http://www.saqqa.org.za). Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, SAQA House, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the Qualification and Unit Standards should reach SAQA at the address below and **no later than 24 December 2007**. All correspondence should be marked **Standards Setting – Electronics** and addressed to

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SAQA

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DIRECTOR: STANDARDS SETTING AND DEVELOPMENT



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**QUALIFICATION:**  
**National Certificate: Electronics**

SAQA QUAL ID	QUALIFICATION TITLE		
59569	National Certificate: Electronics		
ORIGINATOR		PROVIDER	
SGB Electronics			
QUALIFICATION TYPE	FIELD	SUBFIELD	
National Certificate	10 - Physical, Mathematical, Computer and Life Sciences	Information Technology and Computer Sciences	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUAL CLASS
Undefined	120	Level 3	Regular-Unit Stds Based

**PURPOSE AND RATIONALE OF THE QUALIFICATION****Purpose:**

This qualification intends to set standards for a typical learner entering the field of electronics. It will provide learners with foundational, basic knowledge and experiential skills to be able to perform in the electronics field. It will be valuable to potential learners who may have been working or practicing within the electronics field such as electronics artisans, shopfloor workers working within the electronics environment who do not have formal education in electronics and any person wishing to join the electronics field thus providing them with the opportunity for formal recognition of their skills and knowledge through Recognition of Prior Learning.

The qualification is structured in such a way that it enables learners to gain progression towards the higher NQF levels thus creating career opportunities for learners within the electronics environment. The unit standards contained in this qualification will provide building blocks for specific skills that provide access to related qualifications in this field as well as providing articulation possibilities. This qualification is the first in the learning pathway for electronics and articulates vertically to the planned Level 4, FETC: Electronics, National Certificate: Electronics, NQF Level 5 and a National Diploma: Electronics at NQF Level 5. The qualification also provides horizontal articulation to electronics related qualifications within the telecommunications and electronics servicing industries at NQF Level 3.

**Rationale:**

Electronics is a specialised field that requires specific knowledge and skills to be able to operate productively within the sector. People working within the production and operation lines such as assemblers need this qualification to be able to operate effectively within the parameters of legislative and regulatory frameworks governing this sector. It will provide learners with the relevant knowledge, skills, values and attitudes to be able to operate in this sector. Currently there is no targeted electronics qualification existing at an introductory level that will develop key competencies (knowledge, skills, attitudes and values) required in the sector. It seeks to provide people working in the sector and those wishing to join the sector with a relevant qualification fitting for the job.

It will benefit individuals at work, as it is mostly occupational-oriented thus providing learners with knowledge and skills to enable them to meet global electronics standards at an introductory level. This qualification will facilitate articulation to other qualifications which include mechatronics, autotronics and electronic warfare thus facilitating mobility, personal growth within

the electronics field and improve productivity. Learners will have a working understanding of elementary principles within the electronics sector.

**RECOGNIZE PREVIOUS LEARNING?**

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**LEARNING ASSUMED IN PLACE**

Learners are assumed to be competent in:

- Communication, NQF Level 2.
- Mathematics, NQF level 2.
- Computer Literacy, NQF Level 2.

Recognition of Prior Learning:

- This qualification can be achieved in whole or in part through recognition of prior learning. Learners able to demonstrate competency in the exit Level Outcomes and the Specific Outcomes of its constituent Unit Standards will receive recognition of prior learning.

Access to the qualification:

- Access to this Qualification is open to all learners.

**QUALIFICATION RULES**

The qualification has a minimum of 120 credits and is comprised of unit standards that are fundamental, core and elective.

Fundamental component:

- These unit standards to the value of 36 credits are compulsory.

Core component:

- All the unit standards to the value of 58 credits in the core component are compulsory.

Elective component:

- Learners are required to select any elective Unit Standards to the value of 26 credits from the Elective component. It must be noted that the knowledge of basic computer forms an essential part of this qualification and therefore it is recommended that learners who are not computer literate select the Computer Literacy elective consisting of 6 credits, as part of their 26 total elective credits.

**EXIT LEVEL OUTCOMES**

1. Communicate in a variety of ways to achieve personal and workplace objectives within the electronics environment.
2. Use mathematical concepts and processes to solve personal and electronics related problems.
3. Apply elementary principles of electricity and electronics.
4. Demonstrate knowledge of electronic components, instruments and test equipment (hand skills).

5. Assemble cables, harness and printed circuit/wiring boards.

6. Apply safety measures in an electronics environment.

Critical Cross-Field Outcomes:

The qualifying learner will be able to:

- Identifying and solving problems related to electronics by applying concepts of mathematics and logical reasoning in a variety of contexts.
- Working effectively with others when constructing electronics project and ensuring that the work is coordinated effectively with all involved.
- Planning and preparing oneself to meet the organisational requirements and adhere to at all times by ensuring that Occupational Health and Safety policies and procedures are followed when working with electronics for the purposes of personal safety and those of others.
- Using science and technology effectively and critically, showing responsibility towards the environment and others by understanding the role of technology in society and using technology appropriately to retrieve, manage information and solve problems as well as facilitating communication.
- Recognise that problem-solving contexts do not exist in isolation by using both electrical and electronics knowledge and skills to construct and test electronic projects.

#### **ASSOCIATED ASSESSMENT CRITERIA**

Associated Assessment Criteria for Exit Level Outcome 1:

- Communication is relevant and promotes working relationships to achieve organisational goals
- Written and oral communication is applied when communicating information or receiving appropriate instructions or requirements related to carrying out the work.

Associated Assessment Criteria for Exit Level Outcome 2:

- Mathematical principles and methods are applied to facilitate effective measurements.
- Calculations are performed to make basic measurements in a range of electronic applications.

Associated Assessment Criteria for Exit Level Outcome 3:

- Knowledge of electricity and electronic principles is demonstrated by employing relevant theories to solve practical problems.
  - Range: Relevant may refer to but not limited to Atomic theory, semi-conductor theory, electric current theories.
- Knowledge of digital electronic principles is demonstrated by employing relevant theories to solve practical problems.
- Relevant diagrams are sketched with labels and explanations in the context of basic logic symbols and Digital electronic theories.
  - Range: Basic logic symbols refer to AND, OR, NAND, NOR, XOR, XNOR, NOT Gates.

Associated Assessment Criteria for Exit Level Outcome 4:

- Basic electric and electronics components are connected form various functions in circuits.
- Power and signal sources are operated to supply voltage, current and frequency.
- Measuring instruments are used to interpret resistance, capacitance, inductance, voltage, current and frequencies.

Associated Assessment Criteria for Exit Level Outcome 5:

- Coding of harnesses is performed to ensure accuracy of connections.
- Diagrams and parts lists are read and interpreted for the assembling of harnesses in conjunction with conductors and connectors.
- Cables are tested to comply with wiring diagrams.

Associated Assessment Criteria for Exit Level Outcome 6:

- Occupational Health and Safety policies and procedures are applied in the carrying out of the work.
- Occupational Health and Safety policies and procedures and safe work practices are followed to eliminate or minimise dangerous incidents.
- Personnel protective equipment needed to do the work are identified and checked to ensure that they are safe to use in accordance with work policies and procedures.

Integrated Assessment:

Assessment should be focused on the candidate's ability to apply their theoretical knowledge and understanding in authentic contexts. Assessors should use a range of strategies, which will allow candidates to demonstrate applied competence. Applied competence (practical, foundational and reflective) competencies regarding electronics knowledge and skills will be achieved if a candidate can integrate the various outcomes of the unit standards of this qualification. Assessment strategies and procedures should be aligned with the purpose and exist level outcomes of the qualification. They should consist of written assignments, tests and examinations and also include a variety of problem solving assignments, portfolios of learning, materials and projects. The qualification should be assessed on the basis of evidence of demonstrated performance in the workplace or in simulated work situations designed to draw upon similar performance to that required at the workplace.

All exit level outcomes, critical cross-field outcomes, and essential embedded knowledge required by the component unit standards are to be assessed. Evidence of the achievement of the critical cross-field outcomes should be found both in performance and in explaining and applying the essential embedded knowledge.

### **INTERNATIONAL COMPARABILITY**

Electronics is a highly recognised sector, in that the modern world relies on electrical and electronics devices which impact considerably in the domestic and world of work today. Internet research was conducted to identify similar qualifications and/or programmes offered in different countries to determine how this Qualification compares with international qualifications in electronics in terms of scope, level and outcomes as well as considering the nature of countries compared in relation to the history of offering education and training in this subject from socio-economic perspectives. Due to the fact that the electrical and electronic engineering field is broad and vibrant thus interfacing with physics, computer science and engineering, the comparison was made on qualifications that deal with basic electronics and electrical engineering, which include electronic components. The approach used was to determine the international best practice in the comparison of the South African qualification against the international ones.

Comparability with leaders in the field:

The leaders in the field within this subject field in terms of qualifications and provision have been considered to be the Japan, USA and Germany. In addition, other countries such as New Zealand, United Kingdom, Australia, India, China and SADC region have been considered in the research with a view to obtain qualifications and/or programmes as well as short courses offered. Countries such as China and India are considered to be leading in electronics products, but unfortunately their qualifications in Electronics offered at this level could not be accessed. The research conducted in most countries indicated that qualifications offered were engineering

qualifications of which electronics form part, were predominantly pitched at degree, honors, masters and phd levels, which made it difficult to find an introductory electronics qualifications at level 3. Although the USA, Japan and Germany were recommended to be the leading countries in electronics, unfortunately neither of these countries' qualifications were accessible especially Japan and Germany.

Comparability with USA qualifications and standards:

The Institute of Electrical and Electronics Engineers -USA (IEEE-USA) is an organisational unit of the Institute of Electrical and Electronics Engineers international, Inc., that is created to promote the careers and public policy interests of the more than 235 000 electrical, electronics, computer and software engineers including the promotion of engineering awareness and encouraging technological literacy reaching out to two different segments of the public, from nine to 13 year-olds through to adults. The IEEE-USA produces a range of distance-learning packs for training and educational use in the electrical engineering, electronics, and manufacturing and computer software industries. However, most of the qualifications accessed that are recognised by the IEEE in the USA are predominantly offered at higher education levels and thus making it difficult to find the relevant qualifications that could be compared with the South African qualification at NQF Level 3.

Canada, Toronto:

George Brown College:

Electronics Technician Certificate:

George Brown College offers the Electronics Technician Certificate programme that is targeting technicians who work in the field of consumer, commercial and industrial electronics. Many schools and organisations, which have adopted it as part of their training programmes, use this programme. People who intend to work within the electronics environment thus preparing themselves for employment can also access the programme. The programme offered on a modular basis with at least 23 modules. Most of the Modules offered here compare favorably with our South African qualification. The duration of the programme is 32 weeks. The Modules are as follows:

- Introduction to Electronics.
- Current, Voltage and Resistance.
- Ohm's Law, Power and Energy.
- Series Circuits.
- Parallel Circuits.
- Series Parallel Circuits.
- DC Measuring Instruments.
- Network Theorems.
- Magnetism.
- Magnetic Circuits.
- Alternating Voltage and Current.
- Digital Electronics.
- AC Measuring Instruments.
- Capacitance and Capacitors.
- Inductance and Inductors.
- Transformers.
- Alternating Current Circuits.
- Resonance.
- Semiconductor Fundamentals.
- Coupling and Filter Circuits.
- Transistors and Thyristors.

- Amplifier Circuits.
- Integrated Circuits.

Washington State, USA:

Electronics Supply Centre:

Basic Electronics for schools:

The search has identified a certificate course that compares favourably with the South African qualification as it provides basic knowledge packaged for beginners in the electronics field. The course is divided into four modules comprised of different lessons in each module. These modules can be benchmarked against the unit standards contained in the South African qualification that provides learners with key competencies contained in the lessons provided in each module. The modules are depicted as follows:

Basic Electronics DC (direct Current); Basic Electronics AC (Alternating Current); Basic Electronics (Semiconductors); Basic Electronics (Power Supplies):

- Lesson 1:
  - Basic electronics theories and principles; Magnetism; The Atom; Rectifying circuits.
- Lesson 2:
  - Series Circuits; Sine Wave Voltages; Diodes; Filtering.
- Lesson 3:
  - Parallel Circuits; Basic principles of Capacitors; Bipolar Junction Transistors (NPN and PNP); Regulators (I.C Regulator circuits, switch mode regulators).
- Lesson 4:
  - Combination Circuits; Capacitors (reactance and various types of capacitors; Field Effect Transistors; UPS System (uninterruptible power supplies).
- Lesson 5:
  - Rheostats, symbols of variables and potentiometers; Inductors (self induced voltages and calculation of inductors in series; Specialty Devices (Semiconductor devices).
- Lesson 6:
  - Inductors (Autotransformers).
- Lesson 7:
  - RLC Circuits.

USA, Washington State:

Skagit Valley College:

Short Courses:

- Electronics Fundamentals I [5 credits]:
  - Departmental standards on laboratory conduct, reporting, and safety.
  - Ohm's law.
  - Watt's law.
  - Series circuits.
  - Parallel circuits.
  - Series-parallel circuits.
  - Computer solutions.
  - Voltage and current dividers.
  - Resistance, voltage and current meters.
  - Conductors and insulators.
  - Kirchoff's voltage law.
  - Kirchoff's current law.

- Network theorems.

- Electronic Fundamentals II [5 credits]:

- Organisational standards on laboratory conduct, reporting and safety.
- Review of DC concepts.
- Introduction to AC Theory.
- Inductors and Capacitors.
- Reactance and Impedance.
- RL, RC and RLC circuit analysis and characteristics.

Fiji Islands, South Pacific:

Fiji Institute of Technology: School of Electrical and Electronic Engineering:

Trade Certificate in Electronics Engineering:

Fiji has a highly recognised institution that is registered as an Academy and that offers very dynamic comprehensive programmes to school leavers who wish to pursue training in electrical and electronic engineering and their allied industries. The above programme also compares favorably with the South African qualification (Introductory Electronics, NQF Level 3) in terms of the units offered except Applied Mathematics unit although the level of the qualification is not known. The certificate is comprised of the following units:

- Basic electronics.
- Applied Mathematics.
- Electrical Principles.
- Electronics fundamentals.
- Electrical Measurements.
- Occupational Health and Safety.
- Digital Electronics.
- Analogue Electronics.
- Components and Measurements.
- Computer Applications.
- Technical communication.
- Workshop Practice.
- Electronics Project.

United Kingdom

Comparability with UK qualifications and standards:

The comparison was done from the National Database of Accredited Qualifications (Qualification and Curriculum Authority) in which electronics related qualifications found were at NVQ level.

Edexcel: BTEC National Certificate in Electrical/Electronic Engineering (4322):

Edexcel is known to be the largest awarding body in the United Kingdom, which develops a diverse range of vocational and academic qualifications including short courses. The 'BTEC National Certificate in Electrical/Electronic Engineering is at the UK NQF Level 3, which has an equivalence level between our NQF Levels 4 and 5. The comparison was done focusing on the level, content and outcomes of the qualification that is equivalent to our NQF Level 3 qualifications. Although this is a 12-unit qualification which is made up of six core unit standards and six specialist unit standards which compare slightly with few of our unit standards as follows:



- Electrical and Electronic principles.
- Digital electronics.
- Analogue electronics.
- Electronic fault finding.
- Further Electrical Principles.
- Health, Safety and Welfare.

New Zealand:

Comparison with New Zealand qualifications and standards.

Electro Technology Industry Training Organisation: National Certificate in Electronics Technology (Level 3):

This qualification is designed for people who are interested in electronics who may wish to pursue further training and employment in this field. The qualification has been developed for people interested in electronics, who may wish to pursue further training and employment in this field and is offered in high schools. Some of the units standards contained in this qualification compares favourably with the South African qualification as it addresses basic knowledge and skills of electronics although it is comprised of 43 credits as follows:

- Demonstrate and apply knowledge of basic semiconductor devices.
- Demonstrate basic knowledge of basic digital and analogue electronic concepts.
- Describe the development of a new electronic product.
- Demonstrate basic knowledge of signals and the transmission of information.
- Demonstrate basic knowledge of electronic product quality and reliability.
- Demonstrate and apply basic knowledge of microcontrollers.

In addition, there are unit standards identified which do not form part of any qualification within the New Zealand Qualifications Framework pegged at NQF Level 3 which are core electronics for electronics technicians that compare favourably with our qualification. These are:

- Demonstrate and apply introductory knowledge of d.c. principles for electronics technicians.
- Demonstrate and apply introductory knowledge of a.c. principles for electronics technicians.
- Demonstrate and apply introductory knowledge of digital electronics for electronics technicians.
- Demonstrate and apply introductory knowledge of analogue electronics for electronics technicians.

New Zealand:

Universal College of Learning:

Certificate in Electronics and Electrical Technology, NQF Level 3:

This programme is designed to provide new entrants with knowledge and skills in the field of electronics. The programme is targeting individuals who are interested in a career in the electrical and electronics industries as well as offering the stepping-stone to gain broad education and training in this field. The programme compares favourably with our qualification in terms of the content, duration and level as well as covering the fundamental component in relation to mathematical and communication literacy, including computer skills. The course content is as follows:

- Communication.
- Digital electronics.
- Introduction to measurement and fault diagnosis.

- Introductory physics.
- Electronics theory.
- Electrical theory.

Comparability with SADC countries:

Zimbabwe.

In relation to SADC countries, it has been discovered that countries in the SADC region tend to benchmark their qualifications against the South African Qualifications. The only country found to provide a programme in the subject field is Zimbabwe through SIRDC (Electronics and Communications Institute) which offers technology transfer and training services in specialized areas of electronics, electronics circuit design and electronic instrumentation which does not compare fairly well with the standards offered by the South African qualification in that the content/modules of their programme that is partly relevant to our qualification but not addressed at this level are:

- Electronic circuit design fundamentals.
- Electronic instrumentation and control.

Conclusion in terms of international comparability:

Comparing our own qualification and related proposed qualifications with other countries, it seems clear that we are operating at an equivalent level with other countries, including those which are leaders in this field, as well as taking into account the particular requirements of developing nations, including our own. Our qualification falls well within the occupational profiles and training standards of the other relevant countries that we have investigated.

Basic Electronics DC (direct Current); Basic Electronics AC (Alternating Current); Basic Electronics (Semiconductors); Basic Electronics (Power Supplies).

#### **ARTICULATION OPTIONS**

This qualification articulates horizontally with the following registered qualifications:

- Certificate: Electronics Servicing Technology, NQF Level 3.
- Certificate: Telecommunications and Electronics Engineering, NQF Level 3.

This qualification articulates vertically with the following registered qualifications:

- Certificate: Basic Electronics, NQF Level 4.

#### **MODERATION OPTIONS**

Moderation must include both internal and external moderation of assessments. Moderation of assessments will be overseen by the relevant ETQA according to the moderation guidelines and agreed procedures of the relevant ETQA. This qualification can be internally assessed by assessors of the provider and moderated by a moderator registered with the relevant ETQA. Moderation shall comply with SAQA requirements.

#### **CRITERIA FOR THE REGISTRATION OF ASSESSORS**

Assessors for this qualification will hold an NQF Level 4 qualification in Electronics or equivalent qualification in related disciplines, or will be competent in the outcomes of this qualification and have at least two years experience in the field.

Anyone assessing a learner or moderating the assessment of a learner against this qualification or its unit standards must be a constituent registered assessor with the relevant accredited ETQA or an ETQA that has a Memorandum of Understanding with the relevant accredited ETQA.

**NOTES**

Basic computer knowledge is essential. Therefore it is encouraged that learners who are not computer literate should choose, from the elective components, any unit standards together with a Computer Literacy unit standard.

**UNIT STANDARDS**

	<b>ID</b>	<b>UNIT STANDARD TITLE</b>	<b>LEVEL</b>	<b>CREDITS</b>
Fundamental	119472	Accommodate audience and context needs in oral/signed communication	Level 3	5
Fundamental	9010	Demonstrate an understanding of the use of different number bases and measurement units and an awareness of error in the context of relevant calculations	Level 3	2
Fundamental	9013	Describe, apply, analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts	Level 3	4
Fundamental	119457	Interpret and use information from texts	Level 3	5
Fundamental	9012	Investigate life and work related problems using data and probabilities	Level 3	5
Fundamental	119467	Use language and communication in occupational learning programmes	Level 3	5
Fundamental	7456	Use mathematics to investigate and monitor the financial aspects of personal, business and national issues	Level 3	5
Fundamental	119465	Write/present/sign texts for a range of communicative contexts	Level 3	5
Core	115230	Demonstrate knowledge of electrical and electronic components	Level 2	3
Core	115234	Demonstrate knowledge of electrical safe working practices	Level 2	2
Core	113877	Understand fundamentals of electricity	Level 2	8
Core	7427	Use and maintain hand tools and equipment	Level 2	3
Core	10270	Construct Basic Electronic Circuits	Level 3	4
Core	253074	Demonstrate an understanding of basic digital circuits	Level 3	6
Core	253054	Perform basic electrical circuit calculations	Level 3	10
Core	253094	Perform electronic fault-finding	Level 3	3
Core	253334	Test and replace basic electronic components	Level 3	15
Core	114406	Understand basic electronic theory and components	Level 3	4
Elective	12035	Apply personal safety practices on a wastewater treatment works	Level 2	4
Elective	113863	Apply soldering techniques	Level 2	2
Elective	114605	Carry out soldering and de-soldering procedures	Level 2	3
Elective	14928	Demonstrate knowledge of basic concepts of telecommunications	Level 2	7
Elective	9532	Demonstrate basic knowledge of computers	Level 3	6
Elective	115242	Draw and interpret electrical diagrams	Level 3	3
Elective	115245	Fabricate aircraft electrical looms and harnesses	Level 3	10
Elective	119256	Inspect and test electrical circuits	Level 4	6



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Perform basic electrical circuit calculations***

<b>SAQA US ID</b>		<b>UNIT STANDARD TITLE</b>	
253054		Perform basic electrical circuit calculations	
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Electronics			
<b>FIELD</b>		<b>SUBFIELD</b>	
10 - Physical, Mathematical, Computer and Life Sciences		Information Technology and Computer Sciences	
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 3	10

**SPECIFIC OUTCOME 1**

Perform calculations on series and parallel circuits.

**SPECIFIC OUTCOME 2**

Perform calculations using Ohm's law.

**SPECIFIC OUTCOME 3**

Perform calculations using Kirchoff's laws.

**SPECIFIC OUTCOME 4**

Perform basic impedance, capacitive reactance and inductive reactance (RLC) calculations.

**SPECIFIC OUTCOME 5**

Perform basic transformer calculations.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	59569	National Certificate: Electronics	Level 3



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Demonstrate an understanding of basic digital circuits***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
253074	Demonstrate an understanding of basic digital circuits		
<b>ORIGINATOR</b>	<b>PROVIDER</b>		
SGB Electronics			
<b>FIELD</b>	<b>SUBFIELD</b>		
10 - Physical, Mathematical, Computer and Life Sciences	Information Technology and Computer Sciences		
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 3	6

**SPECIFIC OUTCOME 1**

Perform basic conversions of number systems and codes.

**SPECIFIC OUTCOME 2**

Identify and explain the basic operation of digital elements.

**SPECIFIC OUTCOME 3**

Demonstrate an understanding of the electrical behaviour and handling of CMOS devices.

**SPECIFIC OUTCOME 4**

Use Boolean algebra to simplify basic combinational circuits.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	59569	National Certificate: Electronics	Level 3



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Perform electronic fault-finding***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
253094	Perform electronic fault-finding		
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Electronics			
<b>FIELD</b>		<b>SUBFIELD</b>	
10 - Physical, Mathematical, Computer and Life Sciences		Information Technology and Computer Sciences	
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 3	3

**SPECIFIC OUTCOME 1**

Identify the fault in basic electronic circuits.

**SPECIFIC OUTCOME 2**

Identify and describe the causes of fault.

**SPECIFIC OUTCOME 3**

Inspect and test electronic circuit.

**SPECIFIC OUTCOME 4**

Diagnose and rectify fault.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	59569	National Certificate: Electronics	Level 3



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Test and replace basic electronic components***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
253334	Test and replace basic electronic components		
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Electronics			
<b>FIELD</b>		<b>SUBFIELD</b>	
10 - Physical, Mathematical, Computer and Life Sciences		Information Technology and Computer Sciences	
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 3	15

**SPECIFIC OUTCOME 1**

Use measuring instruments to test readings.

**SPECIFIC OUTCOME 2**

Identify and test electronic components.

**SPECIFIC OUTCOME 3**

Use data sheets to replace components.

**SPECIFIC OUTCOME 4**

Operate power and signal sources.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	59569	National Certificate: Electronics	Level 3