

No. 905

29 August 2008

**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

**Electrical Engineering and Construction**

registered by Organising Field 12, Physical Planning and Construction, 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.sqa.org.za](http://www.sqa.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 29 September 2008**. All correspondence should be marked **Standards Setting – Electrical Engineering and Construction** addressed to

The Director: Standards Setting and Development  
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PP DR S BHIKHA  
DIRECTOR: STANDARDS SETTING AND DEVELOPMENT



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**QUALIFICATION:****National Certificate: Railway Signalling: Repair and Maintenance**

SAQA QUAL ID	QUALIFICATION TITLE		
63529	National Certificate: Railway Signalling: Repair and Maintenance		
ORIGINATOR			PROVIDER
SGB Electrical Engineering & Construction			
QUALIFICATION TYPE	FIELD	SUBFIELD	
National Certificate	12 - Physical Planning and Construction	Electrical Infrastructure Construction	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUAL CLASS
Undefined	137	Level 5	Regular-Unit Stds Based

*This qualification does not replace any other qualification and is not replaced by another qualification.*

**PURPOSE AND RATIONALE OF THE QUALIFICATION**

Purpose:

This National Certificate is the culmination of preparing the qualifying learner for further progression in the railway signalling environment in the safe, efficient and effective fault-finding and repair of railway signalling equipment. Learners found competent against this Qualification will be able to execute the fault finding and repair process at a standard that will maintain the safe operations of trains.

This Qualification will enable learners with the flexibility and mobility in the railway signalling and electrical engineering fields, thereby contributing to the quality and skills required to grow and progress accordingly.

A learner acquiring this Qualification will be able to:

- > Communicate effectively with all role-players during the execution of their work.
- > Execute integrity tests on signalling installations according to railway signalling engineering practice and specifications.
- > Supervise railway signalling projects.
- > Apply and implement the related statutory requirements.
- > Plan and prepare the execution of fault finding and repair tasks on railway signalling equipment to component level and solve potential problems that may arise.

Qualifying learners will be able to show responsibility, and independently and effectively manage themselves in the Railway Signalling environment and they will therefore ensure the effective delivery of the relevant and appropriate railway signalling services within the framework of all legal and safety requirements.

Rationale:

This Qualification is for learners who are pursuing management careers with the railway signalling environment and indicates a clear learning pathway which can be followed. It provides learners with opportunities for professional development and career advancement.

This qualification reflects the needs and demands within the railway signalling environment for people who will be able to perform leadership roles within surroundings which are more complex and demand more advanced knowledge, skills and attributes. This Qualification will provide a vehicle through which to develop competent people whom can stay abreast with the changing and dynamic environment of railway signalling as well as create an atmosphere for life-long learning opportunities.

This qualification allows for the further development of learners in the railway signalling environment through vertical mobility to higher-level qualifications and horizontally to qualifications on the same level but in a different discipline. The qualification assists learners in critically evaluating information and exercising appropriate professional judgement.

### **RECOGNIZE PREVIOUS LEARNING?**

Y

### **LEARNING ASSUMED IN PLACE**

- > Mathematical literacy NQF Level 4.
- > Communication NQF Level 4.
- > Unit Standard: Apply train working rules as applicable to railway signalling maintenance personnel: ID 116866, NQF Level 4, 13 Credits.

Access to the Qualification:

Access is open to all learners bearing in mind the learning assumed to be in place.

### **QUALIFICATION RULES**

The Qualification is made up of a combination of learning outcomes from Fundamental, Core and Elective components, totalling a minimum of 137 Credits.

Fundamental component:

- > All unit standards to the value of 14 credits are compulsory.

Core component:

- > All unit standards to the value of 89 credits are compulsory.

Elective component:

- > The elective component consists of individual unit standards from which the learner must choose unit standards based on the area in which they work or in which they are interested. Learners are required to choose unit standards totalling a minimum of 34 credits.

### **EXIT LEVEL OUTCOMES**

On achieving this Qualification, the learner will be able to:

1. Communicate effectively with all role-players during the execution of their work.
2. Execute integrity tests on signalling installations according to railway signalling engineering practice and specifications.
3. Supervise railway signalling projects.
4. Apply and implement the related statutory requirements.
5. Plan and prepare the execution of fault finding and repair tasks on railway signalling equipment to component level and solve potential problems that may arise.

### **ASSOCIATED ASSESSMENT CRITERIA**

Associated Assessment Criteria for Exit Level Outcome 1:

- 1.1 Information is collected, analysed and processed as required in order to make business and workplace related decisions.
- 1.2 Effective written and verbal communication is used in order to promote efficient operations in the workplace.
- 1.3 Work related documentation is sourced, analysed, interpreted and completed in order to maximise productivity and safety.

Associated Assessment Criteria for Exit Level Outcome 2:

- 2.1 System integrity test tools, instruments and equipment are used in terms of the manufactures specifications and according to safety requirements.
- 2.2 Problems regarding the suitability and functionality of test equipment are explained in order to prevent delays in the faultfinding and repair tasks.
- 2.3 The impact of conducting the integrity tests on signalling installations is explained in terms of its impact on operations and safety.
- 2.4 The importance of carrying out integrity tests on railway signalling installations is described in terms of returning it to full operational status.
- 2.5 Relevant stakeholders are communicated with in terms of the results of the integrity of the signalling installations.

Associated Assessment Criteria for Exit Level Outcome 3:

- 3.1 Tasks, resources, timeframes and measurement criteria are defined and aligned to meet organisational objectives.
- 3.2 Methods, procedures and techniques to organise a work unit are applied in accordance with organisational requirements.
- 3.3 The activities of the work unit are analysed and adjusted in order to align to the organisational strategies.
- 3.4 Corrective action is taken in response to performance variances in accordance with Standard Operating Procedures (SOPs).

Associated Assessment Criteria for Exit Level Outcome 4:

- 4.1 Occupational health and safety issues are monitored and implemented according to industry norms and practices.
- 4.2 Authorisation requirements to decommission equipment are explained in terms of safety of the trains.
- 4.3 Legal prescripts which govern railway signalling equipment are identified and explained in terms of their impact on fault finding and repairs.
- 4.4 The inter-relatedness of various railways signalling equipment is explained in terms of the implications to safety.

Associated Assessment Criteria for Exit Level Outcome 5:

- 5.1 The planning of fault finding and repair tasks is carried out in terms of standard operating procedures.
- 5.2 Work flow of repairs is understood based on job requirements and in terms of specific worksite procedures.
- 5.3 The correct resources and materials are procured after evaluating and interpreting all fault and repair information.
- 5.4 Problems regarding the fault finding and repair process are solved effectively as measured against organisational policies and procedures.
- 5.5 The scheduled and planned fault finding and repair tasks are completed in accordance with standard operating procedures.

**INTERNATIONAL COMPARABILITY**

The purpose of this International Comparability study is to facilitate the development of a meaningful learning path and its associated curriculum incorporating both theoretical and practical vocational skills which will ensure compatibility, comparability and compliance with existing international qualification specifications and regulations.

The core and elective unit standards that form part of this qualification have been developed to ensure alignment with the engineering practices embraced by the Institution of Railway Signal Engineers (IRSE).

The IRSE is an international professional institution associated with railway signalling and allied professions. The institution aims to advance for public benefit, the science and practice of signalling engineering within the industry and to maintain high standards of knowledge of the profession. The IRSE recognises and encourages Continuing Professional Development (CPD) to keep abreast of new developments in science and technology within the railway signalling and associated disciplines.

Training Qualifications and Courses referred to were:

United Kingdom:

Signet Solutions:

Course Title: Railway Interlocking:

- > RRI Appreciation (RI).
- > RRI Design Course (RRIDO).
- > RRI Maintenance and Faulting (RRI).
- > RRI Works Testing (Mod 3BI).

Course Title: Signalling Design:

- > AST: Advanced Signalling Technology.
- > BST: Basic Signalling Technology.
- > IST: Control Tables.
- > IST: Signalling the Layout.
- > RRI: Design (RRIDO).
- > Signalling Principles Primer.

Course Title: Signalling Maintenance:

- > Basic Signalling.
- > Cable Jointing.
- > Clamp Locks.
- > Electrical Principles.
- > HW Points.
- > Mechanical Signalling.
- > RRI Maintenance & Faulting (RRI).
- > SMTH: Signal Maintenance Testing Handbook.
- > Style 63 Points.

Course Title: Signalling Testing:

- > Tester in Charge.

- > Principles Tester.
- > RRI Works Testing.
- > Functional Tester.
- > Verification Tester.
- > Functional Tester.
- > Test Assistant.

The above courses align very closely with this South African Qualification as they deal with very similar outcomes. They do however; cover the additional subject of signalling design, which is covered as learning to be in place in this Qualification. This Qualification has the additional aspect of fault finding as opposed their subject of only maintenance.

Symmons Madge Associates:

Course Title: Signalling Principles:

- > Absolute Block Signalling.
- > Track Circuit Block Signalling.
- > One Train Working.
- > Tokenless Block.
- > Radio Token Block.

Course Title: Lineside Signals:

- > Semaphore Signals.
- > Colour Light Signals.

Course Title: Semaphore Signals:

- > Distant Signal.
- > Stop Signal.
- > Subsidiary Signal.
- > Shunting Signal.

Course Title: Multi-Aspect Signals:

- > Junction Indicator.
- > Theatre Type Indicator.
- > Offset Signal.
- > Position Light Signals.
- > Train Detection.

Course Title: Track Circuits:

- > Axle Counters.
- > Treadles.
- > Bi-directional Working.
- > Signal Identification.
- > Failsafe Design.
- > Signals Passed At Danger (SPAD).
- > Signal Sighting.

Course Title: Trackside Signalling Equipment:

- > Mechanical Signalling.

- > Power Operated Signalling.
- > Point Machines.
- > Rail Point Clamp Locks.
- > Hot Axle Box Detectors.

Course Title: Solid State Interlocking (SSI):

- > Integrated Electronic Centre (IECC).
- > Automatic Warning System (AWS).
- > Advanced Warning And Protection Systems.

Course Title: Advanced Warning and Protection Systems:

- > ATP.
- > TPWS.
- > ERTMS.
- > Level Crossing Controls.

Course Title: Station Equipment:

- > Train Ready To Start Plungers (TRTS).
- > Right Away Plunger (RA).
- > OFF Indicators.
- > Public Address.
- > Closed Circuit Television (CCTV).
- > Platform Mirrors.
- > Communications.

The above courses are extremely well aligned to this Qualification as they deal with various types of signalling equipment which is covered by our different Unit Standards. The South African Qualification has additional learning in the form of covering in detail safety around the railway tracks and in the workplace and the aspect of supervising teams.

United States of America:

Signal Training Solutions:

- > Course Title: Apprentice Training: Prepares Individuals For A Career In Signalling.
- > The basics of railway signalling.

Course Title: Crossing Warning Systems Training:

- > Crossing Warning Systems.
- > Gate Mechanics.
- > Constant warning Theory.
- > FRA Par.
- > Grade Crossing Signal System Safety.

Course Title: Microprocessor-Based Interlocking Controllers Training:

- > PLC Familiarisation.
- > PLC Maintenance.
- > PLC Troubleshooting.
- > Vital Harmon Logic Controller.
- > Union Switch and Signal Microlok II Systems.

> Application and Operation of Programmable Controllers.

Course Title: Electro Code Track Circuit Systems Training:

- > EC4 Familiarisation and EC4 Maintenance.
- > EC4 Maintenance.
- > EC4 Troubleshooting.
- > Examining the Electro Code System.
- > Hands-on Practice.

Course Title: Hot Bearing Detector Systems Training:

- > Hot Bearing Detector System Set-up.
- > Hot Bearing Detector System Maintenance.
- > Hot Bearing Detector System Troubleshooting.
- > Hot Bearing Detector System Accessory Equipment.
- > Dragging Equipment Detectors.
- > Car Clearance Detectors.

Course Title: FRA Inspections and Tests Training Program:

- > FRA Rules and Regulations related to Interlocking and Cross Warning Systems.
- > Typical Tests and Inspections.
- > Performing Actual Locking Tests.

The above courses are of a similar vein to our sets of Unit Standards found in both the Core and Elective categories of our Qualification. Some of their courses also cover signalling equipment with different names to ours. They also cover the regulatory requirements around railway signalling.

National Academy of Railroad Sciences (NARS):

Course Title: Guiding Lights:

- > Yellow Signal.
- > Red Signal.
- > Adjust Power Operated Switch Machine.
- > Repair Broken Crossing Gate.
- > Download Data From wayside Signals.
- > Replace a Data Radio.

Course Title: Signal Systems Technician:

- > Wayside Signals.
- > Grade Crossing Controllers.
- > Hot Bearing Detectors.
- > Track Circuits.
- > Train Motion Detection Devices.
- > Installing.
- > Inspecting.
- > Testing.
- > Maintaining Signals and Status Equipment.
- > Electricity and Electronics.
- > Microprocessors.
- > Computers.

- > Fibre optics.
- > Internet Protocol Communications.
- > Applying Innovation to Railroad Systems.

Course Title: Full Applied Associate of Science (AAS) Degree in Signal Electronics:

- > Journeyman.
- > Signalman.

The above courses with the exception of the Degree in Signal Electronics are very similar in what they cover. They both deal with different types of signalling equipment found on railway lines. The degree content would be covered in a higher level Qualification in South Africa.

Iran:

Iran University of Technology:

Course Title: Graduate Degree in Control, Signalling and Telecommunication Engineering:

- > Design Signalling and Telecommunications Systems.
- > Implementing Signalling and Telecommunications Systems.
- > Electronic and Relay Interlocking.
- > Advanced Railway Signalling Systems.
- > Computer Systems' Reliability and Safety.
- > Railway Communication Systems.
- > Railway Traffic Control.
- > Railway Operation and Control.

The above course has some similarities but is not as comprehensive as the South African one. It also covers additional modules regarding the telecommunications systems.

Argentina: Buenos Aires:

The National Railway Training Centre (CENACAF):

Course Title: Signalling:

- > Track Circuits and Signs.
- > Relay Interlocking.
- > Introduction to Subways and Railroad Lines Signalling Systems.
- > Switch Machine.
- > ATS (Automatic Train Stop) and Barriers.

The above course does not compare that well with this one as it only covers certain railway signalling equipment compared to ours and it also deals with subways which at this stage does not apply to South Africa.

Conclusion:

It is clear from this international comparability study that South Africa is very much in line with the rest of the world and during the development of the unit standards cognisance was taken of the implementation of a National Railway Safety Regulator. The National Railway Safety Regulator promotes and controls safe rail operations and recognises that this is fundamental to the safety of all persons and the environment. The Unit Standards in this Railway Signalling Qualification were aligned to these ideals.

**ARTICULATION OPTIONS**

Horizontal articulation is possible with:

- > ID 49746: National Certificate: Measurement Control and Instrumentation, NQF Level 5.
- > ID 58495: National certificate: Medical Equipment Maintenance, NQF Level 5.
- > ID 48573: National Certificate: Information Technology: System Support, NQF Level 5.

Vertical articulation is possible with:

- > ID 49744: National Diploma: Engineering Technology, NQF Level 6.
- > ID 49060: National Degree: Master Craftsmanship (Electrical), 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 moderation guideline detailed in "Qualification Assessor Criteria".
- > Moderation must include both internal and external moderation of assessments at exit points of the Qualification, unless ETQA policies specifies otherwise. 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.
- > Anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution that is accredited by the relevant ETQA.

**CRITERIA FOR THE REGISTRATION OF ASSESSORS**

For an applicant to register as an assessor, the applicant should:

- > Be registered as an assessor with the relevant ETQA or an ETQA that has a memorandum of understanding with the relevant ETQA.
- > Be in possession of a relevant Qualification at NQF Level 6 or higher.

**NOTES**

N/A

**UNIT STANDARDS**

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	252026	Apply a systems approach to decision making	Level 5	6
Fundamental	12433	Use communication techniques effectively	Level 5	8
Core	258242	Apply principles of railway signalling concepts	Level 5	6
Core	258237	Assess the condition of railway signalling equipment	Level 5	3
Core	252022	Develop, implement and evaluate a project plan	Level 5	8
Core	258235	Fault find and repair Flashlight and Boom protected level crossings up to component level	Level 5	3
Core	258257	Fault find and repair Power Supplies up to component level	Level 5	15
Core	258255	Fault find and repair Remote Control Systems up to component level	Level 5	15
Core	258256	Fault find and repair Track Circuits up to component level	Level 5	20

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Core	258241	Fault find and repair axle counters up to component level	Level 5	6
Core	258238	Fault find and repair failsafe data transfer systems up to component level	Level 5	6
Core	243948	Monitor and maintain health, safety and security	Level 5	4
Core	258248	Monitor railway signalling system availabilities	Level 5	3
Elective	258240	Fault find and repair Hot Bearing Detector Systems up to component level	Level 5	6
Elective	258244	Fault find and repair Interlocking NFG Hybrid System up to component level	Level 5	6
Elective	258245	Fault find and repair Modular Interlocking Systems up to component level	Level 5	20
Elective	258243	Fault find and repair Remote Control CS90 up to component level	Level 5	7
Elective	258246	Fault find and repair Train Describer Systems up to component level	Level 5	7
Elective	258236	Fault find and repair Uninterruptible Power Supplies (UPS) up to component level	Level 5	7
Elective	258239	Fault find and repair Vehicle Identification Systems up to component level	Level 5	3
Elective	114226	Interpret and manage conflicts within the workplace	Level 5	8
Elective	252043	Manage a diverse work force to add value	Level 5	6
Elective	119857	Plan and implement Quality Management Systems in corporate and project context	Level 5	8
Elective	258247	Plan and manage maintenance resources	Level 5	7
Elective	120388	Supervise a project team of a small project to deliver project objectives	Level 5	14

**LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION**

None



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:**

***Fault find and repair Flashlight and Boom protected level crossings up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258235	Fault find and repair Flashlight and Boom protected level crossings up to component level		
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Electrical Engineering & Construction			
<b>FIELD</b>		<b>SUBFIELD</b>	
12 - Physical Planning and Construction		Electrical Infrastructure Construction	
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	3

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of flashlight and boomed protected level crossings.

**SPECIFIC OUTCOME 2**

Diagnose faults on the flashlight and boomed protected level crossings.

**SPECIFIC OUTCOME 3**

Repair the fault on the flashlight and boomed protected level crossings.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the flashlight and boomed protected level crossings after completion.

**SPECIFIC OUTCOME 5**

Check integrity of the flashlight and boomed protected level crossings equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

## UNIT STANDARD:

*Fault find and repair Uninterruptible Power Supplies (UPS) up to component level*

SAQA US ID	UNIT STANDARD TITLE		
258236	Fault find and repair Uninterruptible Power Supplies (UPS) up to component level		
ORIGINATOR		PROVIDER	
SGB Electrical Engineering & Construction			
FIELD		SUBFIELD	
12 - Physical Planning and Construction		Electrical Infrastructure Construction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 5	7

*This unit standard does not replace any other unit standard and is not replaced by another unit standard.*

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of power supplies UPS.

**SPECIFIC OUTCOME 2**

Diagnose faults on power supplies UPS.

**SPECIFIC OUTCOME 3**

Repair the fault on the power supplies UPS.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the power supplies UPS after completion.

**SPECIFIC OUTCOME 5**

Check integrity of power supplies UPS equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	ID	QUALIFICATION TITLE	LEVEL
Elective	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Assess the condition of railway signalling equipment***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258237	Assess the condition of railway signalling equipment		
<b>ORIGINATOR</b>	<b>PROVIDER</b>		
SGB Electrical Engineering & Construction			
<b>FIELD</b>	<b>SUBFIELD</b>		
12 - Physical Planning and Construction	Electrical Infrastructure Construction		
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	3

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Explain the complete maintenance philosophy.

**SPECIFIC OUTCOME 2**

Analyse recurring faults to monitor trends.

**SPECIFIC OUTCOME 3**

Prepare and submit equipment/installation change proposals.

**SPECIFIC OUTCOME 4**

Perform asset condition monitoring.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair failsafe data transfer systems up to component level***

SAQA US ID	UNIT STANDARD TITLE		
258238	Fault find and repair failsafe data transfer systems up to component level		
ORIGINATOR		PROVIDER	
SGB Electrical Engineering & Construction			
FIELD	SUBFIELD		
12 - Physical Planning and Construction	Electrical Infrastructure Construction		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 5	6

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of failsafe data transfer system.

**SPECIFIC OUTCOME 2**

Diagnose faults on the failsafe data transfer system.

**SPECIFIC OUTCOME 3**

Repair the faulty failsafe data transfer system.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the failsafe data transfer system after completion.

**SPECIFIC OUTCOME 5**

Check integrity of failsafe data transfer system equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	ID	QUALIFICATION TITLE	LEVEL
Core	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair Vehicle Identification Systems up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258239	Fault find and repair Vehicle Identification Systems up to component level		
<b>ORIGINATOR</b>			<b>PROVIDER</b>
SGB Electrical Engineering & Construction			
<b>FIELD</b>			<b>SUBFIELD</b>
12 - Physical Planning and Construction			Electrical Infrastructure Construction
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	3

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of vehicle identification systems.

**SPECIFIC OUTCOME 2**

Diagnose faults on vehicle identification systems.

**SPECIFIC OUTCOME 3**

Repair the fault on the vehicle identification systems.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the vehicle identification systems after completion.

**SPECIFIC OUTCOME 5**

Check integrity of the vehicle identification systems equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Elective	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair Hot Bearing Detector Systems up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258240	Fault find and repair Hot Bearing Detector Systems up to component level		
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Electrical Engineering & Construction			
<b>FIELD</b>		<b>SUBFIELD</b>	
12 - Physical Planning and Construction		Electrical Infrastructure Construction	
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	6

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of hot bearing detector systems.

**SPECIFIC OUTCOME 2**

Diagnose faults on hot bearing detector systems.

**SPECIFIC OUTCOME 3**

Repair the fault on the hot bearing detector systems.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the hot bearing detector systems after completion.

**SPECIFIC OUTCOME 5**

Check integrity of the hot bearing detector systems equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Elective	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair axle counters up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258241	Fault find and repair axle counters up to component level		
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Electrical Engineering & Construction			
<b>FIELD</b>		<b>SUBFIELD</b>	
12 - Physical Planning and Construction		Electrical Infrastructure Construction	
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	6

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of axel counters.

**SPECIFIC OUTCOME 2**

Diagnose faults on axel counters.

**SPECIFIC OUTCOME 3**

Repair the fault on the axel counter.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the axel counters after completion.

**SPECIFIC OUTCOME 5**

Check integrity of the axel equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:***Apply principles of railway signalling concepts*

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258242	Apply principles of railway signalling concepts		
<b>ORIGINATOR</b>	<b>PROVIDER</b>		
SGB Electrical Engineering & Construction			
<b>FIELD</b>	<b>SUBFIELD</b>		
12 - Physical Planning and Construction	Electrical Infrastructure Construction		
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	6

*This unit standard does not replace any other unit standard and is not replaced by another unit standard.*

**SPECIFIC OUTCOME 1**

Interpret modular equipment circuit diagrams up to component level.

**SPECIFIC OUTCOME 2**

Interpret railway station wiring plans.

**SPECIFIC OUTCOME 3**

Employ specific advanced test equipment.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair Remote Control CS90 up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258243	Fault find and repair Remote Control CS90 up to component level		
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Electrical Engineering & Construction			
<b>FIELD</b>	<b>SUBFIELD</b>		
12 - Physical Planning and Construction	Electrical Infrastructure Construction		
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	7

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of remote control CS90.

**SPECIFIC OUTCOME 2**

Diagnose faults on remote control CS90.

**SPECIFIC OUTCOME 3**

Repair the fault on the remote control CS90.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the remote control CS90 after completion.

**SPECIFIC OUTCOME 5**

Check integrity of remote control CS90 and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Elective	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair Interlocking NFG Hybrid System up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258244	Fault find and repair Interlocking NFG Hybrid System up to component level		
<b>ORIGINATOR</b>			<b>PROVIDER</b>
SGB Electrical Engineering & Construction			
<b>FIELD</b>			<b>SUBFIELD</b>
12 - Physical Planning and Construction			Electrical Infrastructure Construction
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	6

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of interlocking NFG and hybrid systems.

**SPECIFIC OUTCOME 2**

Diagnose faults on interlocking NFG and hybrid systems.

**SPECIFIC OUTCOME 3**

Repair the fault on interlocking NFG and hybrid systems.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the interlocking NFG and hybrid systems after completion.

**SPECIFIC OUTCOME 5**

Check integrity of interlocking NFG and hybrid systems equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Elective	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair Modular Interlocking Systems up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258245	Fault find and repair Modular Interlocking Systems up to component level		
<b>ORIGINATOR</b>	<b>PROVIDER</b>		
SGB Electrical Engineering & Construction			
<b>FIELD</b>	<b>SUBFIELD</b>		
12 - Physical Planning and Construction	Electrical Infrastructure Construction		
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	20

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing.

**SPECIFIC OUTCOME 2**

Diagnose faults.

**SPECIFIC OUTCOME 3**

Repair the fault.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions after completion.

**SPECIFIC OUTCOME 5**

Check integrity of equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Elective	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair Train Describer Systems up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258246	Fault find and repair Train Describer Systems up to component level		
<b>ORIGINATOR</b>	<b>PROVIDER</b>		
SGB Electrical Engineering & Construction			
<b>FIELD</b>	<b>SUBFIELD</b>		
12 - Physical Planning and Construction	Electrical Infrastructure Construction		
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	7

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of train describer systems.

**SPECIFIC OUTCOME 2**

Diagnose faults on train describer systems.

**SPECIFIC OUTCOME 3**

Repair the fault on the train describer systems.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the train describer systems after completion.

**SPECIFIC OUTCOME 5**

Check integrity of the train describer systems equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Elective	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Plan and manage maintenance resources***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258247	Plan and manage maintenance resources		
<b>ORIGINATOR</b>	<b>PROVIDER</b>		
SGB Electrical Engineering & Construction			
<b>FIELD</b>	<b>SUBFIELD</b>		
12 - Physical Planning and Construction	Electrical Infrastructure Construction		
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	7

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan maintenance resources.

**SPECIFIC OUTCOME 2**

Implement maintenance resource plan.

**SPECIFIC OUTCOME 3**

Manage the maintenance resource plan.

**SPECIFIC OUTCOME 4**

Evaluate implementation and recommend alternative plans to improve the use of maintenance resources.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Elective	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:****Monitor railway signalling system availabilities**

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258248	Monitor railway signalling system availabilities		
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Electrical Engineering & Construction			
<b>FIELD</b>		<b>SUBFIELD</b>	
12 - Physical Planning and Construction		Electrical Infrastructure Construction	
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	3

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Identify the cause of reoccurring faults applicable to specific equipment.

**SPECIFIC OUTCOME 2**

Make remedial recommendations.

**SPECIFIC OUTCOME 3**

Record and report on performance of system.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair Remote Control Systems up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258255	Fault find and repair Remote Control Systems up to component level		
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Electrical Engineering & Construction			
<b>FIELD</b>	<b>SUBFIELD</b>		
12 - Physical Planning and Construction	Electrical Infrastructure Construction		
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	15

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of remote control systems.

**SPECIFIC OUTCOME 2**

Diagnose faults on the remote control systems.

**SPECIFIC OUTCOME 3**

Repair the fault on the remote control systems.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the remote control systems after completion.

**SPECIFIC OUTCOME 5**

Check integrity of the remote control systems equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair Track Circuits up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258256	Fault find and repair Track Circuits up to component level		
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Electrical Engineering & Construction			
<b>FIELD</b>		<b>SUBFIELD</b>	
12 - Physical Planning and Construction		Electrical Infrastructure Construction	
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	20

***This unit standard does not replace any other unit standard and is not replaced by another unit standard.***

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of track circuits.

**SPECIFIC OUTCOME 2**

Diagnose faults on track circuits.

**SPECIFIC OUTCOME 3**

Repair the fault on the track circuit.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the track circuits after completion.

**SPECIFIC OUTCOME 5**

Check integrity of track circuit equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:*****Fault find and repair Power Supplies up to component level***

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
258257	Fault find and repair Power Supplies up to component level		
<b>ORIGINATOR</b>	<b>PROVIDER</b>		
SGB Electrical Engineering & Construction			
<b>FIELD</b>	<b>SUBFIELD</b>		
12 - Physical Planning and Construction	Electrical Infrastructure Construction		
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 5	15

*This unit standard does not replace any other unit standard and is not replaced by another unit standard.*

**SPECIFIC OUTCOME 1**

Plan and prepare for fault finding and repairing of power supplies.

**SPECIFIC OUTCOME 2**

Diagnose faults on power supplies.

**SPECIFIC OUTCOME 3**

Repair the fault on the power supplies.

**SPECIFIC OUTCOME 4**

Establish normal operational conditions for the power supplies after completion.

**SPECIFIC OUTCOME 5**

Check integrity of the power supplies equipment and installation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	<b>ID</b>	<b>QUALIFICATION TITLE</b>	<b>LEVEL</b>
Core	63529	National Certificate: Railway Signalling: Repair and Maintenance	Level 5