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**GOVERNMENT NOTICE**

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**SOUTH AFRICAN QUALIFICATIONS AUTHORITY**

No. 322

7 April 2006

**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 qualification and unit standards can be accessed via the **SAQA** web-site at [www.saga.org.za](http://www.saga.org.za). Copies may also be obtained from the Directorate for 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 4 May 2006**. All correspondence should be marked **Standards Setting – SGB for Electrical Engineering and Construction** and addressed to

The Director: Standards Setting and Development

**SAQA**

**Attention: Mr. D Mphuthing**

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**S BHIKHA**  
DIRECTOR STANDARDS SETTING AND DEVELOPMENT



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

### QUALIFICATION:

#### *Further Education and Training Certificate: Domestic Appliance Repair*

SAQA QUAL ID	QUALIFICATION TITLE		
50371	Further Education and Training Certificate: Domestic Appliance Repair		
SGB NAME	ORGANISING FIELD ID	PROVIDER NAME	
SGB Electrical Engineering & Construction	12		
QUAL TYPE	ORGANISING FIELD DESCRIPTION	SUBFIELD	
Further Ed and Training Cert	Physical Planning and Construction	Electrical Infrastructure Construction	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUALIFICATION CLASS
Undefined	146	Level 4	Regular-Unit Stds Based

#### **PURPOSE AND RATIONALE OF THE QUALIFICATION**

Purpose:

This qualification will enhance the social status, productivity and employability of the learner within the electrical engineering and energy sector and contribute to the quality, production rate and growth of the electrical engineering and energy sector.

Through the critical cross-field outcome component of the qualification, learners are able to demonstrate vocational skills through which they are able to engage in life skills activities, small business development, health and environmental issues.

A person acquiring this qualification will have skills, knowledge and experience to:

- > Evaluate and apply essential methods to technical operational systems in the fuel gas, refrigerated and advanced electronic domestic appliance repair industry.
- > **Analyse** and apply acquired knowledge in performing the tasks and solve common problems on fuel gas, refrigerated and advanced electronic domestic appliances.
- > Gather and analyse relevant information, use data to apply theories and principles within fuel gas, refrigerated and advanced electronic as well as electrical engineering related situations related to domestic appliances.
- > Execute **role** and responsibilities by being able to summarise, classify, discuss and estimate application processes required through mathematical concepts, technical and schematic diagrams, computer and technology usage in a range of different contexts.
- > Communicate with peers, customers and members of supervisory/management levels by presenting information reliably and accurately in spoken and written form.

Rationale:

This is the third occupational based qualification in a series for learners that reflect the workplace-based needs of the Domestic Appliance Repair industry that is expressed by employers and employees, both now and for the future. This qualification provides the learner with accessibility to be employed within the domestic appliance repair industry field and provides the flexibility to pursue different careers in the broader domestic appliance repair industry and energy sector and articulate within the Engineering, Electrical Construction, Generation, Transmission and Distribution specialization contexts. It also provides the Learner with enough knowledge and skills to pursue small business opportunities within the private sector through which the private sector and the economy can benefit.

For those who have acquired experience in the workplace, this qualification represents part of the RPL process to acknowledge workplace **skills** acquired without the benefit of former education or training.

**RECOGNIZE PREVIOUS LEARNING?**

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**LEARNING ASSUMED TO BE IN PLACE**

It is assumed that learners are already competent in the following:

- > Mathematical Literacy at NQF Level 3.
- > Communication at NQF Level 3.

Recognition of prior learning:

This qualification may be obtained through Recognition of Prior Learning (RPL). The learner should be thoroughly briefed on the mechanism to be used and support and guidance should be provided. Care should be taken that the mechanism used provides the learner with an opportunity to demonstrate competence and is not so onerous as to prevent learners from taking up the RPL option towards gaining a qualification.

Access to the qualification:

Access to this qualification is open bearing in mind learning assumed to be in place. It is preferable that learners first complete the NC: Domestic appliance repair, ID no 49056 at NQF Level 3 before accessing this qualification.

**QUALIFICATION RULES**

The rules of combination for this Qualification:

The Fundamental consists of 20 first language, 20 second language and 16 credits for Mathematical Literacy. All are compulsory.

Core Unit Standards:

- > This amounts to 70 credits.
- > All are compulsory

Elective Unit Standards:

- > This amounts to 48 Credits of which a minimum of 20 Credits must be done.

The total Credits for this Qualification are 173 Credits of which a minimum of **146 Credits must be** achieved.

**EXIT LEVEL OUTCOMES**

1. Understand principles related to domestic fuel gas appliances and electrical circuits.
2. Test defective appliances to determine cause of fault.
3. Repair and carry out routine maintenance on appliances.
4. Compile reports related to faulty appliances and their repair.

**ASSOCIATED ASSESSMENT CRITERIA**

1.

- > Knowledge and skills regarding technical operational systems on fuel gas, refrigerated and advanced electronic domestic appliances are demonstrated according to maintenance procedures.
- > Understanding of personal safety practices in an appliance repair and maintenance, engineering and energy environment are applied according to standard operating procedures and safety requirements.

2.

- > Electrical engineering sketches and drawings are used to evaluate and analyse in context fuel gas, refrigerated and advanced electronic domestic appliances.
- > Data is used, theories and principles applied to do fault finding, problem solving and repairs on fuel gas, refrigerated and advanced electronic domestic appliances systems and control gear.

3.

- > Knowledge and skills to install, commission and maintain fuel gas, refrigerated and advanced electronic

domestic appliances are demonstrated according to relevant procedures.

> Knowledge and analytical skills are applied to repair and maintain fuel gas, refrigerated and advanced electronic domestic appliances and systems according to specialised contexts requirements and relevant procedures.

#### 4.

> Written reports are presented clearly in a timely manner in the required format to appropriate parties as per company specific policies.

> Verbal report is done in an assertive, clear and concise manner.

Integrated assessment:

The applied competence (practical, foundational and reflective competencies) of this qualification will be achieved if a learner is able to achieve all exit level outcomes of the qualification.

The identification and solving of problems, team work, organising self, using of technical diagrams, implication of actions and reactions in the world as a set of related systems must be assessed during any combination of practical, foundational and reflexive competencies assessment methods and tools to determine the whole person 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 tool(s) to establish the foundational, reflective and embedded knowledge to problem solving and application of the world as a set of related systems within the electrical installation and maintenance environment.

> A detailed portfolio of evidence is required to prove the practical, applied and foundational competencies of the learner.

> Assessors and moderators should develop and conduct their own integrated assessment by making use of a range of formative and summative assessment methods. Assessors should assess and give credit for the evidence of learning that has already been acquired through formal, informal and non-formal learning and work experience. Summative assessment 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.

Unit standards associated with the qualification must be used to assess specific and critical cross-field outcomes. During integrated assessments the assessor should make use of formative and summative assessment methods and should assess combinations of practical, applied, foundational and reflective competencies.

### **INTERNATIONAL COMPARABILITY**

This Qualification was benchmarked against international standards and qualifications. The unit standards on which this qualification is based were compared with unit standards from New Zealand, Australia and Scotland in terms of their range of electrical qualifications, unit standard titles, specific outcomes, assessment criteria and degree of difficulty.

This Qualification has been compiled to be more specific with the focus areas on fuel gas, refrigerated and advanced electronic domestic appliances. The qualifications for the above mentioned countries are subdivided into different areas of appliance with respect to fuel gas, refrigerated and advanced electronic domestic appliances.

The overall scope of the other countries' Unit Standards for the electrical field has been adequately covered in the core requirement of this qualification. The focus and complexity level of the core Units Standards compares very well, but the upliftment of literacy, numeracy and social skills have been emphasized more in the fundamental requirement of this Qualification to redress the inequalities of the past. More credits are therefore needed for this qualification than what is required for similar international qualifications.

The core and elective unit standards of this qualification are more focused on the practical application, with the theoretical requirements built into the embedded knowledge. Only a few Unit Standards focus on theory, but they are written more generically than those of the other countries. The international Qualifications on the other hand, included more knowledge-based Unit Standards with less credits linked to it. As a result of legal criteria associated with the gas as well as the refrigeration industry the unit standards are aligned to the South African standards which in turn are aligned to the international benchmarking.

### **New Zealand**

Qualifications title: - National certificate in electrical appliance servicing (Ref: NZ Domestic appliance qualifications)

- > Level of qualification: 4
- > Credit total: **141**
- > Level 1 credits: 1
- > Level 2 credits: 33
- > Level 3 credits: **41**
- > Level 4 credits: 66

Purpose:

This qualification is for technicians engaged in the servicing of electrical appliances. It incorporates a variety of skills and underpinning knowledge, which prepare technicians to competently and safely service domestic whiteware, a wide range of small appliances, and electric tools. The qualification also meets the legal requirements for registration as an Electrical Service Technician with the Electrical Workers Registration Board at a level, which allows for connection of single-phase appliances to fixed-wired outlets.

More specifically, the following skills and knowledge are covered:

- > First aid and cardio-pulmonary resuscitation.
- > Safe electrical work practices.
- > Magnetism, electricity, and mains supply systems.
- > Soldering and wiring skills, and flexible leads.
- > Electrical protection, isolation, and connection to the supply.
- > Safety and operational testing of appliances.
- > Single phase motor theory and replacement.
- > Proper use of tools.
- > Power supplies and semiconductor devices.
- > Brazing and soldering.

The qualification can typically be gained during a three year apprenticeship. It is a useful foundation for product-specific training, and may be followed by study for the proposed National Diploma in Engineering (Level 6) with strands in Computer Engineering, Electrical Engineering, Electronics, industrial Measurement and Control, and Telecommunications.

- > Alternating current and three-phase theory.
- > Refrigeration principles.
- > Principles and circuit diagrams of domestic appliances.
- > Customer service skills.
- > Fault-finding technique.

Demonstration of competence in practical servicing of electrical appliances.

Australia

The ANTA qualifications are divided into certificates and unit standards could not be matched but are incorporated into the qualifications.

- > Certificate II Qualifications.
- > Qualification title: *CII* in Electrotechnology Servicing.
- > UTE 2 05 99.

Description of the qualification:

Those gaining this qualification will be able to install and carry out basic routine maintenance on either antennas, automotive accessories, office equipment, refrigerator and air conditioning equipment, domestic appliances standard communications equipment or security installations.

Description of the specialisation within the qualification:

- > Specialisation: Appliances - Electrical, Typical work function: installation and adjustment of electrical appliances, washing machines, dryers, heaters, stoves, and other small, Typical work environment: Domestic and light commercial premises, eg. households, offices, kitchens and restaurants.
- > Specialisation: Appliances - Refrigeration, Typical work function: Installation and adjustment of

refrigerators, freezers, room air conditioners, Typical work environment: Domestic and light commercial premises, eg. households, offices, kitchens and restaurants.

> Specialisation: **Component/Equipment Assembly**, Typical work function: Assembly of electrical/electronic equipment or components including printed circuit boards, Typical work environment: Industrial premises.

> Certificate III Qualifications.

> Qualification title: **CII** in Electrotechnology Assembly and Servicing.

> UTE 3 01 99.

Description of the qualification:

Those gaining this qualification will be able to maintain and repair electrical appliances, components and machines within a variety of industrial, commercial and domestic contexts.

Description of the specialisation within the qualification:

> Specialisation: **Appliances**, Typical work function: Installation maintenance and repair of electrical appliance equipment, washing machines, dryers, heaters, refrigerators, freezers, room air conditioners, stoves and small appliances, Typical work environment: Domestic and light commercial premises eg. households, offices, kitchens and restaurants, and repair workshops.

> Certificate III Qualifications.

> Qualification title: **CIII** in Electrotechnology Computer Systems.

> UTE 3 05 99.

Description of the qualification:

Those gaining this qualification will be able to install, commission, maintain and carry out maintenance on computer equipment used in commercial and home office situations.

Description of the specialisation within the qualification:

> Specialisation: **Appliances**, Typical work function: Installation maintenance and repair of electrical appliance equipment, washing machines, dryers, heaters, refrigerators, freezers, room air conditioners, stoves and offices, small appliances, Typical work environment: Domestic and light commercial premises eg. households, kitchens and restaurants, and repair workshops.

> Certificate III Qualifications.

> Qualification title: **CIII** in Electrotechnology Entertainment and Servicing

> UTE 3 07 99.

Description of the qualification:

Those gaining this qualification will be able to install, commission, maintain and carry out maintenance on equipment used for audio and video recording, processing and reproduction.

Description of the specialisation within the qualification:

> Specialisation: **Electronic Appliances**, Typical work function: Installation, commissioning, maintenance and repair of electronic appliances, Typical work environment: Domestic, commercial and industrial environments.

> Certificate III Qualifications.

> Qualification title: **CIII** in Electrotechnology Refrigeration and Air Conditioning.

> UTE 3 09 99.

Description of the qualification:

Those gaining this qualification will be able to install, commission, maintain, fault find and repair refrigeration and air conditioning components, equipment and systems in domestic, commercial and industrial premises.

Description of the specialisation within the qualification:

Specialisation: **Domestic Appliances**, Typical work function: Installation, maintenance and repair of domestic appliances, Typical work environment: Domestic whitegoods appliances including refrigerators, freezers, washing machines, clothes dryers and dishwashers.

Scotland

> Qualification name: **BTEC First Diploma in Electronics**.

> Qualification level: **Level 2**.

> Qualification type: **Vocationally related**.

## Structure:

- > 360 guided learning hours.
- > Each unit has 60 guided learning hours.
- > This is a six-unit qualification with three core units and three from a selection of specialist units.

## Content scope of qualification:

The aim of the award is to provide education and training to meet the needs of the electrical, electronic and telecommunications disciplines. The core units focus upon the underpinning principles: applied science and mathematics for technicians, working practices and electronic fundamentals. The qualification has a similar academic content to the GNVQ but with an increased bias to the vocational area. It provides the underpinning knowledge requirements for several NVQs at level 2. Mapping to occupational standards is included in the documentation. The qualification has links to the approved technical certificates for SEMTA foundation modern apprenticeships. Candidates are also expected to develop broad skills, knowledge and personal qualities and attributes necessary for employment. The application of science and mathematics is linked to both electrical and mechanical disciplines; the syllabus is common to other first diploma pathways. Unit 2 (Working practices) introduces health and safety, the handling and storage of chemicals and materials and communication.

## Units:

- > Core units.
  - > Unit 1 Applied science and mathematics for technicians.
  - > Unit 2 Working practices (assessed by an integrated vocational assignment).
  - > Unit 3 Electronic fundamentals.
- > Optional specialist units (choose three from seven).
  - > Unit 4 Telecommunications technology.
  - > Unit 5 Introduction to digital networks.
  - > Unit 6 Electronic maintenance fundamentals.
  - > Unit 7 Electronic circuit construction and testing.
  - > Unit 8 PC configuration fundamentals.
  - > Unit 9 Radio and television systems.
  - > Unit 10 Domestic electrical appliance principles and technology.

## Canada

- > Qualifications name: Electric Appliance Servicers and Repairers.
- > Qualifications No: 7332.

Electric appliance servicers and repairers service and repair domestic electrical appliances. They are employed by repair shops, appliance service companies and repair departments of retail and wholesale establishments.

## Example Titles

- > Appliance repairer apprentice.
- > Appliance service technician.
- > Appliance service technician apprentice.
- > Appliance servicer.
- > Dishwasher repairer.
- > Refrigerator repairer.
- > Service technician - electrical appliances.
- > Stove repairer.
- > Vacuum cleaner repairer.
- > Washing machine servicer.

## Main duties:

- > Small appliance repairers perform some or all of the following duties:
  - > Repair small appliances, such as electrical lawn and garden equipment and power tools.
  - > Consult customer or refer to work order to establish nature of the appliance malfunction.

- > Observe operation of appliance and conduct voltage, resistance and other tests using electrical test equipment.
  - > Refer to schematic drawings or product manuals and replace or repair parts or components using hand tools and soldering equipment.
  - > Prepare estimates and written accounts of work performed.
- > Major appliance repairers/technicians perform some or all of the following duties;
- > Repair major appliances, such as domestic refrigerators and window air conditioners, in customer's home during service calls or in repair shop.
  - > Consult customer or refer to work order to establish nature of the appliance malfunction.
  - > Diagnose faults by checking controls, condensers, timer sequences, fans and other components using test equipment such as meters and gauges to measure resistance, current, voltage and pressure.
  - > Refer to schematic diagrams or product manuals and disassemble appliance using hand tools.
  - > Replace components and subcomponents and reassemble appliance using hand tools and soldering and brazing equipment.
  - > Prepare estimates and written accounts of work performed.
  - > Plan service routes.

#### Employment requirements:

- > Small appliance repairers usually require some specialized college or high school courses or several months of on-the-job training.
  - > Major appliance service/repair technicians require some secondary school education and completion of a college program in appliance repair.
- or
- > Completion of a three- or four-year apprenticeship program in appliance repair.
  - > Appliance service technician trade certification is compulsory in Alberta and available, but voluntary, in Newfoundland, Nova Scotia New Brunswick, Prince Edward Island, British Columbia and the Northwest Territories.
  - > Interprovincial trade certification (Red Seal) is available to qualified appliance service technicians,

#### USA

- > Qualifications name: Home Appliance Repairers.

Employers generally require a high school diploma for home appliance repairer jobs. Once employed, repairers of small appliances usually are trained on the job, whereas repairers of large household appliances often are trained in a formal trade school, in a community college, or directly from the appliance manufacturer. Mechanical and electrical aptitudes are desirable, and those who work in customers' homes must be courteous and tactful. Employers prefer to hire people with formal training in appliance repair and electronics. Many repairers complete 1- or 2-year formal training programmes in appliance repair and related subjects in high schools, private vocational schools, and community colleges. Courses in basic electricity and electronics are becoming increasingly important as more manufacturers install circuit boards and other electronic control systems in home appliances. Whether their basic skills are developed through formal training or on the job, trainees usually receive additional training from their employer and from manufacturers. In shops that fix portable appliances, they work on a single type of appliance, such as a vacuum cleaner, until they master its repair. Then they move on to others, until they can repair all those handled by the shop. In companies that repair major appliances, beginners assist experienced repairers on service visits. They also may study on their own. They learn to read schematic drawings, analyze problems, determine whether to repair or replace parts, and follow proper safety procedures. Up to 3 years of on-the-job training may be needed for a technician to become skilled in all aspects of repair.

Some appliance manufacturers and department store chains have formal training programmes that include home study and shop classes, in which trainees work with demonstration appliances and other training equipment. Many repairers receive supplemental instruction through 2- or 3-week seminars conducted by appliance manufacturers. Experienced repairers also often attend training classes and study service manuals. Repairers authorized for warranty work by manufacturers are required to attend periodic training sessions.

The U.S. Environmental Protection Agency (EPA) has mandated that all repairers who buy or work with refrigerants be certified in the proper handling of refrigerants. In order to become certified, a technician must pass a written examination. Exams are administered by EPA-approved organizations, such as trade schools, unions, and employer associations. There also are EPA-approved take-home certification exams. Although no formal training is required for certification, many of these organizations offer training



programmes designed to prepare workers for the certification examination.

In addition to earning the certification required by the EPA, home appliance repairers may exhibit their competence by passing one of several certification examinations offered by various organizations. Although voluntary, such certifications can be helpful when seeking employment. The National Appliance Service Technician Certification (NASTeC), which is administered by the International Society of Certified Electronics Technicians (ISCET), requires repairers to pass a comprehensive examination that tests their competence in the diagnosis, repair, and maintenance of major home appliances. Examinations are given in three specialty areas of appliance repair: refrigeration and air-conditioning; cooking; and laundry and dishwashing. Although the NASTeC credential does not expire, continuing education classes are available so that repairers can keep abreast of technological changes. The Professional Service Association (PSA) administers a similar certification programme. Those who pass the PSA examination earn the Certified Appliance Professional (CAP) designation, which is valid for 4 years. If CAP-certified repairers complete at least 15 credit hours of instruction each year during the 4 years, they need not take the examination to become recertified. Otherwise, they must take the examination again to become recertified.

Repairers in large shops or service centres may be promoted to supervisor, assistant service manager, or service manager. Some repairers advance to managerial positions such as regional service manager or parts manager for appliance or tool manufacturers. Preference is given to those who demonstrate technical competence and show an ability to get along with other workers and customers. Experienced repairers who have sufficient funds and knowledge of small-business management may open their own repair shops.

### **ARTICULATION OPTIONS**

N/A

### **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 ETQAs policies and guidelines for assessment and moderation; in terms of agreements reached around assessment and moderation between ETQAs (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, unless ETQA policies specify 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**

Assessors need:

- > To be in possession of a qualification at NQF Level 5 or above.
- > To be registered as assessors with the relevant Education and Training Quality Assurance Body.

### **NOTES**

Qualification review and linkages:

The appliances envisaged for the repair and maintenance in this level of qualification would include but would not be limited to the grouping of appliances as explained below.

- > Domestic gas appliances.
- > Free standing stoves.
- > Hobs.
- > Water heaters.
- > Space heaters.



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Fundamental	119471 Use language and communication in occupational learning programmes	Level4	5	Registered
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## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:**

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
123450	Understand the operating principles of domestic fuel gas appliances		
<b>SGB NAME</b>	<b>ORGANISING FIEL ID</b>	<b>PROVIDER NAME</b>	
SGB Electrical Engineering & Construction	12		
<b>UNIT STANDARD TYPE</b>	<b>ORGANISING FIELD DESCRIPTION</b>	<b>SUBFIELD DESCRIPTION</b>	
Regular	Physical Planning and Construction	Electrical Infrastructure Construction	
<b>ABET BAND</b>	<b>CREDITS</b>	<b>NQF LEVEL</b>	<b>UNIT STANDARD TYPE</b>
Undefined	8	Level 4	Regular

**SPECIFIC OUTCOME 1**

State the essential requirements for the safe operation of gas appliances.

**SPECIFIC OUTCOME 2**

Understand the fuel gases used in domestic appliances and the principles of their combustion.

**SPECIFIC OUTCOME 3**

Describe and explain the operating principles of domestic gas appliances.

**SPECIFIC OUTCOME 4**

Demonstrate understanding of safe servicing procedures applicable to domestic gas appliances.



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:**

**Explain the function and operation of domestic refrigeration circuits and their components**

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
123451	Explain the function and operation of domestic refrigeration circuits and their components		
<b>SGB NAME</b>	<b>ORGANISING FIELD ID</b>	<b>PROVIDER NAME</b>	
SGB Electrical Engineering & Construction	12		
<b>UNIT STANDARD TYPE</b>	<b>ORGANISING FIELD DESCRIPTION</b>	<b>SUBFIELD DESCRIPTION</b>	
Regular	Physical Planning and Construction	Electrical Infrastructure Construction	
<b>ABET BAND</b>	<b>CREDITS</b>	<b>NQF LEVEL</b>	<b>UNIT STANDARD TYPE</b>
Undefined	8	Level 4	Regular

**SPECIFIC OUTCOME 1**

Explain the purpose and operation of a defrost system.

**SPECIFIC OUTCOME 2**

Explain and demonstrate the function and principles of operation of various refrigeration system components and accessories in accordance with manufacturer's specifications.

**SPECIFIC OUTCOME 3**

Demonstrate the function and operation of various refrigeration system controls.

**SPECIFIC OUTCOME 4**

Prepare and select components and accessories.

**SPECIFIC OUTCOME 5**

Understand and explain how to Leak Test a system.

**SPECIFIC OUTCOME 6**

Evacuate a system.



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:**

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
123452	Understand electrical and mechanical engineering principles as applicable to air conditioning and refrigeration systems of domestic appliances		
<b>SGB NAME</b>	<b>ORGANISING FIELD ID</b>	<b>PROVIDER NAME</b>	
SGB Electrical Engineering & Construction	12		
<b>UNIT STANDARD TYPE</b>	<b>ORGANISING FIELD DESCRIPTION</b>	<b>SUBFIELD DESCRIPTION</b>	
Regular	Physical Planning and Construction	Electrical Infrastructure Construction	
<b>ABET BAND</b>	<b>CREDITS</b>	<b>NQF LEVEL</b>	<b>UNIT STANDARD TYPE</b>
Undefined	7	Level 4	Regular

**SPECIFIC OUTCOME 1**

Name and explain the thermodynamic properties of commonly used refrigerants in domestic appliances.

**SPECIFIC OUTCOME 2**

Explain and apply concepts of open and closed systems as used in domestic appliances.

**SPECIFIC OUTCOME 3**

Explain and apply concepts of fluid mechanics.

**SPECIFIC OUTCOME 4**

Explain and apply concepts of flow rates.



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**UNIT STANDARD:**

**Identify refrigerant containers, explain hazards and handling procedures and use of refrigerants in domestic appliances**

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
123453	Identify refrigerant containers, explain hazards and handling procedures and use of refrigerants in domestic appliances		
<b>SGB NAME</b>	<b>ORGANISING FIELD ID</b>	<b>PROVIDER NAME</b>	
SGB Electrical Engineering & Construction	12		
<b>UNIT STANDARD TYPE</b>	<b>ORGANISING FIELD DESCRIPTION</b>	<b>SUBFIELD DESCRIPTION</b>	
Regular	Physical Planning and Construction	Electrical Infrastructure Construction	
<b>ABET BAND</b>	<b>CREDITS</b>	<b>NQF LEVEL</b>	<b>UNIT STANDARD TYPE</b>
Undefined	6	Level 4	Regular

**SPECIFIC OUTCOME 1**

List and discuss the hazards when handling refrigerants and containers.

**SPECIFIC OUTCOME 2**

Name and identify the type of refrigerants in containers and systems.

**SPECIFIC OUTCOME 3**

Transfer refrigerant from a container to a service cylinder or a dial-a-charge.

**SPECIFIC OUTCOME 4**

Prepare containers for refrigerant transfer.

**SPECIFIC OUTCOME 5**

Demonstrate and/or explain the handling and storing of refrigerant containers without endangering self, others, the plant or the environment.

**SPECIFIC OUTCOME 6**

Explain the use of refrigerants in cooling systems.



**SOUTH AFRICAN QUALIFICATIONS AUTHORITY**

*UNIT STANDARD:*

**Repair and maintain domestic fuel gas appliances**

<b>SAQA US ID</b>	<b>UNIT STANDARD TITLE</b>		
123454	Repair and maintain domestic fuel gas appliances		
<b>SGB NAME</b>		<b>ORGANISING FIELD ID</b>	<b>PROVIDER NAME</b>
SGB Electrical Engineering & Construction		12	
<b>UNIT STANDARD TYPE</b>		<b>ORGANISING FIELD DESCRIPTION</b>	<b>SUBFIELD DESCRIPTION</b>
Regular		Physical Planning and Construction	Electrical Infrastructure Construction
<b>ABET BAND</b>	<b>CREDITS</b>	<b>NQF LEVEL</b>	<b>UNIT STANDARD TYPE</b>
Undefined	12	Level 4	Regular

**SPECIFIC OUTCOME 1**

Locate faults in domestic gas appliances and determine their causes.

**SPECIFIC OUTCOME 2**

Prepare for repair and maintenance.

**SPECIFIC OUTCOME 3**

Repair gas appliances.

**SPECIFIC OUTCOME 4**

Maintain gas appliances.

**SPECIFIC OUTCOME 5**

Apply pressure-test on system for recommission.