No. 197 **11 March 2005**

Established in terms of Act 58 of 1995

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

Engineering

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

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

Comment on the unit standards should reach SAQA at the address ***below and no later than 11 April 2005.*** **All** correspondence should be marked **Standards Setting – SGB for Engineering** and addressed to

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DUGMORE MPHUTHING
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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:

B Tech: Engineering Technology

SAQA QUAL ID	*QUALIFICATION TITLE*		
49509	B Tech: Engineering Technology		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
QUAL TYPE		*FIELD*	*SUBFIELD*
National First Degree		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUALIFICATION CLASS*
Undefined	**480**	Level **7**	Regular-ELOAC

PURPOSE AND RATIONALE OF THE QUALIFICATION

The purpose of the qualification is to develop the necessary knowledge, understanding and skills required for learner's further learning towards becoming competent practicing engineering technologists. It is intended to subsequently empower candidate engineering technologists to demonstrate that they are capable of applying their acquired knowledge, understanding, skills, attitudes and values in the work environments in South Africa. It is designed also to add value to the qualifying learner in terms of enrichment of the person, status and recognition.

A person achieving this qualification will be able to:

> Competently apply an integration of theory, principles, proven techniques, practical experience and appropriate skills to the solution of broadly defined problems in the field of engineering while operating within the relevant standards and codes.

> Demonstrate well-rounded general engineering knowledge, as well as systematic knowledge, of the main terms, procedures, principles and operations of one of the disciplines of engineering.

> Gather evidence from primary sources and journals using advanced retrieval skills, and organize, synthesize and present the information professionally in a mode appropriate to the audience.

> Apply the knowledge gained to new situations, both concrete and abstract, in the workplace/community.

> Identify, analyse, conduct and manage a project.

> Make independent decisions/judgments taking into account the relevant technical, economic, social and environmental factors.

> Work independently, as a member of a team, and as a team leader.

> Relate engineering activity to health, safety and environment, cultural, and economic sustainability.

> Meet the requirements for registration with the Engineering Council of South Africa as a Candidate Engineering Technologist.

> Demonstrate the capacity to explore and exploit educational, entrepreneurial, and career opportunities, and to develop him/herself professionally.

> Proceed to postgraduate studies, both course-based and research based.

Rationale

The Engineering profession contributes to the technological, socio-economic, built environment and environmental infrastructure of the country, facilitating socio-economic growth and sustainability.

A 480 Credit Qualification in Engineering Technology is designed to meet the needs of the country in respect of engineering competence.

The target markets include both a traditional branch of engineering, andlor a significant industrial area. The qualification is the starting point of a career path in one of the areas of specialization, but is still generic enough to allow maximum mobility, based on recognition of prior learning, within the industry. Skills, knowledge, values and attitudes reflected in the qualification are building blocks for the development of candidate engineering technologists towards becoming competent engineering technologists.

The qualification is intended to:
> Promote the development of engineering knowledge and skills that are required to serve public and private needs.
> Release the potential of people.
> Provide opportunities for people to move up the value chain.
> Provide learners with life-long learning and articulation opportunities in the engineering profession.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

At the entry level, the learner is assumed to **be** proficient at NQF Level **4,** or equivalent, in:
> Mathematics
> Physical Science.
> English and the language of instruction

The first 360 credits of this qualification is the same as the 360 credits of the corresponding National Diploma. If this qualification is offered to candidates who have completed the corresponding National Diploma, then the entrance qualification will be the National Diploma and the candidate will be given exemption of the corresponding 360 credits
(or the qualification that will replace the National Diploma after implementation of the NAP and HEQF)

Recognition of prior learning

Providers may make use of recognition of prior learning at intermediate levels but must take full responsibility for assuring that the exit level outcomes are fulfilled.

QUALIFICATION RULES

NQF level and assigned credits

The programme leading to the qualification shall be a **480** minimum credits or equivalent programme with a minimum of 120 credits at the present NQF Level 7.

Knowledge profile of the graduate

The content of the programme when analysed by knowledge area shall not fall below the minimum credit values of the total actual credit for the programme specified for each knowledge area in Table 1. Knowledge areas are defined in Appendix **A.**

Minimum curriculum content by knowledge area

Knowledge Area : Credits
Mathematical Sciences: **40**
Basic Sciences: 20
Engineering Sciences: 120
Engineering Design: **50**
Computing and IT: **40**
Complementary Studies: 20 & **50**
Subtotal: 290

Discretionary to reach at least the minimum total: (190)
Total: 480

The discretionary component allows for flexibility in providing for the diverse needs of the different engineering disciplines. It shall be allocated to the six knowledge areas, to form 2 coherent, balanced programme.

Core and specialist requirements

The allocation of credits shall result in a coherent core of mathematics, basic sciences and fundamental engineering sciences that provides a viable platform for further studies and lifelong learning. The coherent core enables development in a traditional discipline or in an emerging field. The coherent core embraces both fundamental and core elements as defined by SAQA.

A programme shall contain specialist engineering discipline specific learning outcomes at the exit level. Discipline specific learning may lead to core (compulsory) or elective credits.

In the Complementary Studies area, the programme is expected to contain a balance of material.

EXIT LEVEL OUTCOMES

1: Problem Solving
Apply engineering principles to systematically diagnose and solve broadly defined engineering problems.

Range: Problems are Stage 1 broadly-defined engineering problems having some or all of the following characteristics:
> Problems require identification and analysis, may be ill-posed and have a degree of uncertainty.
> Problems may be unfamiliar, but are capable of interpretation for solution by technologies in practice area.
> Approach solution using structured analysis techniques in well-accepted and innovative ways.
> Information is complex and possibly incomplete, requires validation and supplementation and compilation into information base.
> Solutions may be partially outside standards and codes, may require judgement, may operate outside standards and codes with justification.
> Involves a variety of factors which may impose conflicting constraints.

2: Application of Scientific and Engineering Knowledge
Demonstrate the application of mathematical, science and engineering knowledge in an engineering environment.

Range: Knowledge is characterized by some or all of the following:
> Coherent range of fundamental principles in mathematics, basic science and engineering science underlying a sub-discipline or recognised practice area.
> Coherent range of fundamental principles in engineering science and technology underlying an engineering sub-discipline or recognised practice area.
> Systematic body of knowledge in specialist area or recognised practice area.
> Professional communication, social impact, environmental impact, cost analysis, quality procedures.
> Use of engineering technology, supported by established models, physical principles and mathematics to aid solving technological problems.

3: Engineering Design
Perform procedural and non-procedural design of broadly defined components, systems, works, products or processes to meet desired needs within applicable standards, codes of practice and legislation.

Range: Design problems conform to the definition of Stage 1 broadly-defined engineering problems given with ELO 1

4: Communication
Communicate technical, supervisory and general management information effectively, both orally and in writing, using appropriate language and terminology, structure, style and graphical support.

Range: Communicate professional work to peers, other disciplines, client and stakeholder audiences, selecting appropriate modes of communication

5: Engineering Management
Apply engineering management principles and concepts to engineering activities.

6: Project Development
Identify, analyse, conduct and manage a project.

Range: Investigation andlor research and development

7: Application **of** Complementary Knowledge
Demonstrate a critical awareness of the impact of engineering activity on the social, industrial and physical environment, and of the need to act professionallywithin own limits of competence.

Range: The combination of social, workplace (industrial) and physical environmentalfactors must be appropriate to the discipline or other designation of the qualification. Evidence may include case studies typical *of* engineering practjce situations in which the graduate is likely to participate.

Critical Cross-Field Outcomes and Equivalent Exit Level Outcome

> Identifying and solving problems in which responses display that responsible decisions using critical thinking have been made. Exit Level Outcomes 1, 2, 3, 6, 7
> Working effectively with others as a member of a team, group, organisation and community. Exit Level Outcomes 2, 3, 4, 6,7
> Organising and managing oneself and one's activities responsibly and effectively. Exit Level Outcomes 3, 5, 6, 7
> Collecting, analysing, organising and critically evaluating information. Exit Level Outcomes 1, 2, 3, 4, 6
> Communicating effectively using visual, mathematical and/or language skills. Exit Level Outcomes 1, 2, 3, 4, 6, 7
> Using science and technology effectively and critically, showing responsibility toward the environment and health of others. Exit Level Outcomes 1, 2, 3, 5, 6, 7
> .Demonstrating an understanding of the world as a set of related systems by recognising that problem contexts do not exist in isolation. Exit Level Outcomes 1, 2, 3, 6, 7
> Contributing to the full personal development of each learner and the social and economic development of society at large, by making it an underlying intention of the programme of learning *to* make an individual aware of:□
Reflecting on and exploring a variety of strategies to learn more effectively. Exit Level Outcomes 2, 7
Participating as responsible citizens in the life of local, national and global communities. Exit Level Outcomes 2, 3, 7
Being culturally and aesthetically sensitive across a range of contexts. Exit Level Outcomes 3, 4, 5, 7
Exploring education and career opportunities. Exit Level Outcomes 5, 7
Developing entrepreneurial opportunities. Exit Level Outcomes 5, 7

ASSOCIATED ASSESSMENT CRITERIA

Competency and Range and Assessment Criteria

1.1 Identify and define the problem.
1.1.1 A broadly-defined engineering problem/desired outcome is identified.
1.1.2 The factors/variables influencing the problem are identified.
1.1.3 Criteria against which a solution can be measured are identified.
1.1.4 A clear description of the problem and its effects on the whole system is provided.
1.1.5 The relevant assumptions, premises and constraints are identified and recorded

1.2 Gather information relating to the problem.
1.2.1 Information relating to the problem is gathered.
1.2.2 Appropriate data collection methods are applied.
1.2.3 Statistical methods are applied to information sampling.
1.2.4 Facts and evidence are distinguished from assumptions and inferences.
1.2.5 Related systems and sub-systems are identified.

1.3 Analyse the information relating to the problem.□
1.3.1 Available information is assessed for accuracy and relevance.
1.3.2 Appropriate systems analysis tools are chosen.
1.3.3 Mathematics, basic science, engineering science and practical experience are applied as required.
1.3.4 Sound engineering judgement is applied in the process.
1.3.5 Relevant information is presented in a methodical and logical format comprehensible to peers/co-workers and team leaders.

1.4 Evaluate and select appropriate methodologies for the problem solution.
1.4.1 Appropriate solution methodologies are evaluated.
1.4.2 Appropriate systemic tools and techniques are identified to remedy the problem
1.4.3 The preferred solution methodology is stated and justified.
1.4.4 The solution methodology takes workplace-safety-into account.

1.5 Synthesize potential solutions to the problem.
1.5.1 Sound engineering judgement is applied within the system.
1.5.2 Fundamental engineering principles are applied when necessary.
1.5.3 Mathematics, basic science, engineering science, systems engineering and practical experience are applied as required.
1.5.4 Appropriate assistance is obtained when required.
1.5.5 Potential/relevant solutions are proposed.

1.6 Evaluate and select the preferred solution.
1.6.1 The potential solutions are tested for technical, economic and operational feasibility.
1.6.2 The impact of the potential solution on other systems, sub-systems and processes is determined.
1.6.3 The preferred solution is articulated in a logical and methodical manner.Range: Oral, written
1.6.4 The system is tested to ensure that the problem has been solved.
1.6.5 The preferred solution appropriately addresses the premises, assumptions, constraints and desired outcomes.

2.1 Demonstrate competence to use and integrate appropriate mathematical, basic science and engineering principles to solve engineering problems.
2.1.1 The correct approach to solving the problem is chosen and justified using given criteria.
2.1.2 The problem is described using appropriate mathematical, basic science and engineering principles.
2.1.3 The solution to the engineering problem is demonstrated.
2.1.4 The solution is validated against the desired outcome.
2.1.5 The preferred solution appropriately addresses the premises, assumptions, constraints and desired outcomes.

2.2 Demonstrate competence to use and apply appropriate measuring instruments and techniques to solve engineering problems.
2.2.1 Appropriate measuring instruments are chosen and justified.
2.2.2. Calibration of the measuring instrument is validated.
2.2.3. Valid measuring techniques are correctly applied.
2.2.4. The observations are correctly recorded, analysed and evaluated.
2.2.5. The preferred solution appropriately addresses the premises, assumptions, constraints and desired outcomes.

2.3 Describe and perform the operation and maintenance of resources / processes / systems.
2.3.1. The operation of equipment and components / products / processes / systems is described and explained, both practically and theoretically.
2.3.2. Equipment is successfully operated against specified requirements.
Range: Performed independently and under supervision
2.3.3. An appropriate maintenance strategy is chosen and performed.

2.4 Plan, implement, report and improve on engineering processes.
2.4.1. A problem associated with a typical engineering process is identified and possible improvements suggested.
2.4.2. Modifications to components / products / processes / systems are identified, planned, and performed in line with appropriate engineering strategies.
2.4.3. The candidate makes a significant contribution both as an individual, and as a member of a team.
2.4.4. Continuous improvements to the system / process are applied.

3.1 Identify and analyse specific project objectives, and plan and formulate the criteria for an acceptable design solution.
3.1.1 The problem / design is contextualised, and the implications of the design are described.
3.1.2 The candidate's role within the multidisciplinary/team project is identified and outlined, including his/her relationship / line function to the team leader / supervisor.
3.1.3 The scope of the project / design is identified and defined.
3.1.4 Internal and external factors influencing the design including codes of practice and legislation are identified and recorded.
3.1.5 A strategy and critical path to solve the problem is formulated.

3.1.6 The relevant assumptions, premises and constraints are identified and recorded.

3.2 Access, acquire and evaluate the relevant knowledge, information and resources.
3.2.1 Available information (knowledge and data) is assessed for accuracy and completeness.
3.2.2 New information that is required is identified
3.2.3 Relevant sources of information are identified (library, internet, scientific data banks, etc).
3.2.4 Relevant data and information are collected, collated, analysed and synthesized.
3.2.5 New information/ missing data is generated by applying appropriate procedures such as experimental, computational or deductive reasoning.
3.2.6 Relevant information is presented in a logical and methodical manner.

3.3 Generate and analyse alternative solutions by applying appropriate engineering knowledge.
3.3.1 Standard and non-procedural methodologies / correlations are used to generate solutions.
3.3.2 Any non-procedural methods are synthesised and justified using scientific reasoning.
3.3.3 Solutions are analysed and evaluated to test their validity, feasibility and their potential integration into larger system/s.

3.4 Select the optimal solution based on technical, operational and economic criteria, and evaluate the impacts and benefits of the proposed design.
3.4.1 Solutions are evaluated using defined criteria and ranked according to appropriateness and preferability.
Range: Costs, benefits, advantages, limitations.
3.4.2 The selection of the preferred solution relative to other solutions is justified.
3.4.3 The preferred solution is further evaluated in terms of economic,. social and environmental impacts.
3.4.4 The preferred solution / design is optimised with the aid of computational / simulation tools.
3.4.5 A sensitivity analysis of the preferred solution *is* undertaken.
3.4.6 The preferred solution appropriately addresses the premises, assumptions, constraints and desired outcomes.

3.5 Implement the solution.
3.5.1 An implementation strategy and pian is devised.
3.5.2 The responsibilities of team members are recognised / delegated and documented for the successful implementation of the solution.
3.5.3 The implemented solution is evaluated against the initial 'design criteria' specifications.

3.6 Communicate the design logic and information in the appropriate format.
3.6.1 The design is presented in an acceptable technical report format.
3.6.2 The content is selected and arranged in a logical manner and graphics are integrated appropriately.
3.6.3 Correlations / methodologies used are clearly stated, justified and referenced.
3.6.4 All assumptions are stated and justified.
3.6.5 Technical and professional vocabulary is used throughout the report.

4.1 Generate and assemble appropriate data and information, using available resources.
4.1.1 An appropriate search methodology is used to gather data and information.
4.1.2 Data and information is clustered into logical themes/sub-themes.
4.1.3 Sources of information are listed, identifying the various concepts/ideas obtained from each source.
4.1.4 Reference lists are compiled and displayed according to a standard convention.

4.2 interpret technical data.
Range: Technical books, Management manuals, Periodicals, Data packs, Technical, Research and Management reports
4.2.1 Technical, supervisory and general management data and categories are created and selected to organise information pertaining to the documents.
4.2.2 Information is appropriately transferred from one form into another.
4.2.3 A computer is effectively used to process, produce and present data.
4.2.4 Valid conclusions are drawn from technical, supervisory and general management data.

4.3 Apply graphical techniques to present information effectively.
Range: Line graphs, histograms, pie charts, bar charts, line graphs, polar plots and 3D graphs.
4.3.1 Data/information that could best be displayed graphically is identified.
4.3.2 Graphical tools within the selected software package(s) are used to produce an effective graphical presentation of the data.

4.4 Generate, construct and assemble technical documents.

Range: Technical specifications and project reports
4.4.1 An appropriate type of workplace document for the purpose is chosen and justified against selected criteria.
4.4.2 The structure, style and language are appropriate to the document type.
4.4.3 Tables, figures and other graphical techniques are appropriately integrated.
4.4.4 Task- and readership-appropriate style, register and vocabulary are assessed against given criteria.

4.5 Communicate interactively with individuals and with members of a group.
Range: Meetings
4.5.1 Ideas are presented clearly and logically.
4.5.2 Ideas from other individuals are encouraged.
4.5.3 Listening skills are demonstrated
4.5.4 Effective and confident participation in discussions is demonstrated.
4.5.5 A comprehensive report on the outcome of discussions, including the views of all participants is presented orally and/or in writing.

4.6 Generate, construct, assemble and deliver a technical presentation
Range: A multi-disciplinary audience. Project overviews and reports, end-results, conclusions and recommendations.
4.6.1 The needs and knowledge of a simulated audience are identified and information is pitched at the appropriate level.
4.6.2 An appropriate presentation format is chosen according to the occasion.
4.6.3 Presentation slides and handout documentation is produced using effective layouts and formats.
4.6.4 A variety of effective verbal presentation techniques are used with confidence.
4.6.5 The verbal presentation is integrated with the visual aids / electronic media to communicate the information effectively.

5.1 Apply entrepreneurial principles to engineering activities.
Range: product, service or process.
5.1.1 Criteria for a successful entrepreneur in a specialised field are identified.
5.1.2 A prototype / innovation / systems improvement is conceptualised.
Range: technical and economic feasibility.
5.1.3 Various components of a business plan are identified and presented.
5.1.4 The effects of the prototype / innovation / systems improvement are assessed.
Range: social or environmental.
5.1.5 The relevant assumptions, premises and constraints are identified and recorded.

5.2 Practice engineering management principles.
Range: General engineering operations and at least two of the following: Quality assurance maintenance, procurement, operation, safety, environment, human resources.
5.2.1 Principles are described and applied to a project, process or operation.
5.2.2 Performance measures/benchmarks are identified.
5.2.3 A performance monitoring plan is developed.
5.2.4 Projects, processes and/or operations are monitored and controlled.
5.2.5 An action plan is devised (when deviations from the norm occur).

5.3 Formulate and evaluate a project / process plan.
5.3.1 Project management fundamentals are described and applied.
5.3.2 Constraints relating to the project are identified.
5.3.3 Project resources are identified.
5.3.4 A project plan is formulated and documented.
5.3.5 Productivity issues relating to the project / process are considered.

6.1 Formulate a project.
6.1.1 The project is identified and described.
6.1.2 The purpose, importance and significance of the study is presented.
6.1.3 The specific tasks in the study are identified.
6.1.4 The resource requirements are estimated.
6.1.5 A time framework for the study is provided.
6.1.6 The relevant assumptions, premises and constraints are identified and recorded.

6.2 Describe and justify the theoretical framework and methodology to address the project.
6.2.1 Relevant sources of information on the project brief are surveyed.
6.2.2 Related systems and sub-systems are identified.

6.2.3 Key questions / problems / issues are identified.
6.2.4 The relevant theoretical framework is described, justified and applied.
6.2.5 The relevant methodology to address the project brief is described and justified.
6.2.6 A project proposal is presented.

6.3 Conduct and manage the project.
6.3.1 The project investigation / development is conducted in accordance with industry practice.
6.3.2 Appropriate data collection methods are applied.
6.3.3 Statistical methods are applied to information sampling
6.3.4 Observations made are consistently and accurately recorded.
6.3.5 The project process is successfully managed.

6.4 Analyse the information gained / results of the project.
6.4.1 Facts and evidence are distinguished from assumptions and inferences.
6.4.2 Optimum process conditions are identified through analyses of results in accordance with process requirements
6.4.3 Errors and redundancies are identified through analyses of the data in accordance with standard statistical methods.

6.5 Draw conclusions / Make recommendations based on the project.
6.5.1 Valid conclusions are drawn based on the results of the project.
6.5.2 Recommendations for process / product optimisation are developed from the results of experiments and trials in accordance with organisation requirements, resources, and constraints.
6.5.3 implications of applying recommendations to actual industrial processes / products are identied and described in accordance with process requirements and environmental, economic, and safety factors.

6.6 Produce a report of the completed work.
6.6.1 An abstract that clearly states the problem investigated, the methodology and equipment used, the results obtained and the conclusions drawn, is produced.
6.6.2 A properly referenced literature survey is presented.
6.6.3 The methodology and equipment used is described
6.6.4 The data, analysis, results, discussion, and recommendations are presented in accordance to organisational requirements.
6.6.5 The complete project appropriately addresses/complies with the premises, constraints, assumptions and desired outcome(-s).

7.1 Relate engineering activity to environmental, cultural and safety issues.
7.1.1 A problem in a workplace process is identified and possible improvements applied.
7.1.2 Pertinent social issues, safety and environmental laws and regulations are identified.
7.1.3 Criteria are selected for the critical assessment of environmental management techniques and technologies
7.1.4 Potential hazards and their consequences are identified.
7.1.5 The potential impact of engineering activity on social and environmental issues is critically evaluated.
7.1.6 Relevant environmental management and safety principles are applied and justified.
7.1.7 An environmental assessment of an aspect of the workplace is carried out.
7.1.8 The relevant assumptions, premises and constraints are identified and recorded.

7.2 Exhibit awareness of the need for professionalism.
7.2.1 Reasons for maintaining continued competence and for keeping abreast of up-to-date tools and techniques are listed.
7.2.2 The system of professional development is described.
7.2.3 The boundaries of competence in problem solving and design are discerned.
7.2.4 Decision making is limited to area of current competence.
7.2.5 Judgment is displayed in decision making during problem solving and design.
7.2.6 The design or solution of a problem is justified in terms of ethical considerations.
7.2.7 The learner accepts responsibility for own actions.

Integrated assessment

Providers of programmes shall in the quality assurance process demonstrate that an effective integrated assessment strategy is used. Clearly identified components of assessment must address summative assessment of the exit level outcomes. Evidence should be derived from major work or multiple instances of limited scale work.

INTERNATIONAL COMPARABILITY

International comparability of the whole qualification standard is ensured through the Sydney Accord. The standards are comparable with those for qualifications in engineering in countries having comparable engineering education systems to South Africa, namely, Australia, Canada, Ireland, New Zealand and the United Kingdom. Comparability is audited by mutual visits.

ARTICULATION OPTIONS

The exit level outcomes ensure that a graduate of a programme meeting these standards would meet requirements for entry to a number of programmes including:
> A learnership programme leading to the qualification required for registration as a Professional Engineering Technologist.
> A learnershipgrogramme leading to the qualification required for registration as a Professional Certificated Engineer/Competent Engineering Practitioner.
> Formal specialist study towards post-graduate qualifications in Engineering;
> Specialist coursework masters programmes.
> Research masters programmes, with or without coursework components.
> With responsible work experien'ce, the Master of Business Administration.

MODERATION OPTIONS

Providers of programmes shall in the quality assurance process demonstrate that an effective moderation process exists to ensure that the assessment system is consistent and fair.

Registration of assessors is delegated to the Higher Education and Training (HET) providers responsible for programmes.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

N/A

NOTES

Qualifiers:

The qualification may have a disciplinary or cross-disciplinary qualifier (discipline, branch, option or endorsement) defined in the provider's rules for the technology qualification and reflected on the academic transcript and technology qualification certificate, subject to the following:

(a) The designation must contain the word "Engineering". The qualifier may contain one or more combinations of the following descriptors: Chemical, Civil, Computer, Electrical, Electro-mechanical, Industrial, Mechanical, Metallurgical and Mining. Designations are not restricted to this list.
(b) The qualifier must clearly indicate the nature and purpose of programme.
(c) The fundamental engineering science content must be consistent with the qualifier.
(d) The target market indicated by the qualifier may be a traditional branch of engineering or a substantial industry area.
(e) In the case of a provider offering programmes with minor differences in content, only one programme should be accredited.
(f) The designation should be comparable with typically occurring programmes within Sydney Accord countries.

Definition of Knowledge Areas

Basic Sciences
Physics (including mechanics), chemistry, earth sciences and the biological sciences which focus on understanding the physical world, as applicable in each engineering disciplinary context.

Complementary Studies
Those disciplines outside of engineering sciences, basic sciences and mathematics which:
> Are essential to the practice of engineering, including engineering economics, the impact of technology on society and effective communication; and
> Broaden the student's perspective in the humanities and social sciences in order to understand the world in which engineering is practised.

Computing and Information Technologies

The use of computers, networking and software to support engineering activity, and as an engineering activity in itself, as appropriate to the discipline.

Engineering Design and Synthesis
The creative, iterative and often open-ended process of conceiving and developing components, systems and processes. Design requires the integration of engineering, basic and mathematical sciences, working under constraints, taking into account economic, health and safety, social and environmental factors, codes of practice and applicable laws.

Engineering Sciences
These are rooted in the mathematical and physical sciences, and where applicable, in other basic sciences, but extend knowledge and develop models and methods in order to lead to engineering applications and solve engineering problems.

Mathematical Sciences
This is an umbrella term embracing the techniques of mathematics, numerical analysis and statistics cast in an appropriate mathematical formalism.

Calculation of SAQA Credits and Allocation to Knowledge Area

The method of calculation assumes that certain activities are scheduled on a regular weekly basis while others can only be quantified as a total activity over the duration of a course or module. This calculation makes the following assumptions:

1. Classroom or other scheduled contact activity generates notional hours of the student's own time for each hour of scheduled contact. The total is given by a multiplier (see third column of table below) applied to the contact time.

2. One week of full time activity accounts for assessments in a semester.

3. Assigned work generates only the notional hours judged to be necessary for completion of the work and is not multiplied.

Define for each course or module identified in the rules for the technology qualification:
Type of Activity - Time Unit in hours - Contact time multiplier
L = number of lectures per week - Tl = duration of a lecture period - Mt = total work per lecture period
T = number of tutorial per week - Tt = duration of a tutorial period - Mt = total work per tutorial period
P = total practical periods - Tp = duration of an institution-based practical period - Mp = total work per practical period
X = total other contact periods - Tx = duration of other period - Mx = total work per other period
A = total assignment non-contact hours - Ta = 1 hour
D = total no of days of workplace-based learning - Td = duration of work-based learning per day - Md=total workplace-based learning per period.
W = number of weeks the course lasts (actual + 2 week per semester for assessment, if applicable to the course or module)

The credit for the course is calculated using the formula:

$$C = \{W(LTl\ Ml + TTt\ Mt) + PTp\ Mp + XTx\ Mx + ATa + DTdMd\}/10$$

The resulting credit for a course or value may be divided between more than one knowledge area. In allocating the credit for a course to multiple knowledge areas, only new knowledge or skills in a particular area may be counted. Knowledge and skills developed in other courses and used in the course in question shall not be counted. Such knowledge is classified by the nature of the area in which it is applied. In summary, no knowledge is counted more than once as being new.

MD may differ for different activities e.g. the factor for work-based learning component in which the learner develops skills which integrate theoretical knowledge with actual practice in a working environment will differ from the factor for a related assignment and project work which enhances learner understanding of the work environment and/or new learning.

All learning that is assigned credits must satisfy the following criteria:
> The competencies to be achieved and contributions to knowledge areas are clearly defined and documented.

> The learning is quality assured by the provider.
> A student's performance is assessed against defined outcomes.
> Evidence of the assessment process *is* presented in the accreditation evaluation

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

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:

National Certificate: Lift Inspection

SAQA QUAL ID	*QUALIFICATION TITLE*		
49511	National Certificate: Lift Inspection		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
QUAL TYPE		*FIELD*	*SUBFIELD*
National Certificate		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUALIFICATION CLASS*
Undefined	150	Level 5	Regular-Unit Stds Based

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is aimed at people who work or intend to work within the lift industry, and who seek recognition for essential skills in lift and escalator inspection.

Recipients of this qualification know about and are able to conduct lift inspections to ensure user safety in lift and escalator operations.

The qualification is designed to be flexible and accessible so that people are able to demonstrate the competencies required to work safely in the lift industry.

People credited with this qualification are able to:

> Communicate in a variety of ways.
> Use mathematics in real life situations.
> Conduct electrical measurements.
> Conduct mechanical measurements.
> Release entrapped passengers from immobile lift.
> Inspect and test lifts and escalators.
> Produce and maintain administrative reports.
> Manage projects.

Rationale:

The South African legislation specifies that all lifts must be inspected at least every three years by a registered lift inspector, and that new installations must also be inspected prior to being commissioned for use. This qualification provides a learner with all the skills and knowledge required of a lift inspector and may be seen as a pathway towards registration as a lift inspector.

The majority of the candidates for this qualification are likely to be working in the lift industry. This qualification will give them the opportunity to balance their practical skills with the essential knowledge needed to earn a formal qualification in lift inspection without formal education becoming an impassable barrier.

There is a critical need in the industry to identify people who are able to conduct the essential operations associated with efficient and safe lift inspection. This will lead to competence in the field of work and thereby add value to the industry and improve the economy of the country. It will also lead to a balanced society in that learners will understand how the work they do fits into the greater engineering industry.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

It is assumed that candidates embarking onlearning towards this qualification are already competent in the following areas:

>Working at heights and in confined spaces.
> Mathematics at NQF level 4.
> Safe working practices.
> Basic knowledge of electrical theory.
> Basic knowledge of engineering practices.
> The ability to select, use and care for electrical mea'suring instruments.
> The ability to select, use and care for engineering measuring equipment.
> The ability to read and interpret engineering drawings.

Recognition of prior learning:

This qualification can be achieved wholly or in part through recognition of prior learning in terms of the defined exit level outcomes andlor individual unit standards.

Evidence can be presented in various ways, including international andlor previous local qualifications, products, reports, testimonials mentioning functions performed, work records, portfolios, videos of practice and performance records.

All such evidence will be judged in accordance with the general principles of assessment described above and the requirements for integrated assessment.

QUALIFICATION RULES

Fundamental:
> Candidates are required to achieve all 52 credits listed in the fundamental category, as these will enhance the learner's ability to learn towards the core unit standards.

Core:
> Candidates must achieve all 72 credits listed in the core category in Exit Level Outcomes.

Elective:
> Candidates must achieve at least 26 credits of their choice from any of the available elective credits in Exit Level Outcomes. In order to achieve an Exit Level Outcome, candidates must achieve all of the credits for that particular ELO.

EXIT ***LEVEL OUTCOMES***

1. Communicate at work.

2. Use mathematics and statistics in real life situations.

3. Release entrapped passengers from immobile lift.

4. Inspect and test lifts and escalators.

5. Produce and maintain administrative reports.

6. Manage projects.

Exit Level Outcome; Possible credits F*; C*; E*:
> Communicate at work; 18; ;
> Use mathematics and statistics in real life situations; 26; ;
> Release entrapped passengers from immobile lift; ; 4;
> Inspect and test lifts and escalators; ; 46;
> Produce and maintain administrative reports; ; 22; 13
> Manage projects;8 ; ; 20
> Totals; 52; 72; 33
> Credits required; 52; 72; 26

*Note: F = Fundamentals; C = Core: E = Elective

Critical cross-field outcomes:

This qualification addresses the following critical cross-field outcomes, as detailed in the unit standards:

> Identifying and solving problems in which responses indicate that responsible decisions using critical and creative thinking have been made.
> Use mathematics and statistics in real life situations.
> Release entrapped passengers from immobile lift.
> Inspect and test lifts and escalators.
> Produce and maintain administrative reports.
> Manage projects.

> Working effectively with others as a member of a team, group, organisation or community.
> Communicate at work.
> Release entrapped passengers from immobile lift.
> Produce and maintain administrative reports.
> Manage projects.

> Organising and managing oneself and one's activities responsibly and effectively.
> Inspect and test lifts and escalators.
> Produce and maintain administrative reports.
> Manage projects.

> Collecting, analysing, organising and critically evaluating information.
> Inspect and test lifts and escalators.
> Produce and maintain administrative reports.
> Manage projects.

> Communicating effectively using visual, mathematical and/or language skills in the modes of oral/written persuasion.
> Communicate at work.
> Use mathematics and statistics in real life situations.
> Produce and maintain administrative reports.
> Manage projects.

> Using science and technology effectively and critically, showing responsibility towards the environment and health of others.
> Release entrapped passengers from immobile lift.
> Inspect and test lifts and escalators.

> Demonstrating and understanding of the world *as* a set of related systems by recognising that problem-solving contexts do not exist in isolation.
> Inspect and test lifts and escalators.
> Produce and maintain administrative reports.
> Manage projects.

Learning programmes directed towards this qualification will also contribute to the full personal development of each learner and the social and economic development of society at large, by making individuals aware of the importance of:

> Reflecting on and exploring a variety of strategies to learn more effectively.
> Participating as responsible citizens in the life of local, national and global communities.
> Being culturally and aesthetically sensitive across a range of social contexts.
> Exploring education and career opportunities: and developing entrepreneurial opportunities.

ASSOCIATED ASSESSMENT CRITERIA

1.
> Oral communication is maintained and adapted as required to promote effective interaction in a work context.
> Information is accessed from standing instructions, visual information and a range of other workplace texts and responses where required are appropriate to the context.

> Written communication is clear and unambiguous and at an appropriate level for designated target audiences.

2.
> Mathematical functions are used correctly to solve routine workplace problems and tasks.
> Findings on life related problems are interrogated in terms of their cause and solution.
> Mathematical techniques are effectively and accurately applied in real life situations.

3.
> Entrapped passengers are safely released from an immobile lift.
> Unsafe conditions are identified and corrective actions are taken.
> Access to workplace is limited to involved personnel only.

4.
> Inspections comply with manufacturers standards and statutory requirements.
> Understanding of the relevant OHS and SANS requirements is demonstrated.
> Unsafe conditions are identified and corrective actions are taken.
> Access to workplace is limited to involved personnel only.
> Electrical circuits are tested in accordance with manufacturer standards.

5.
> Reports are generated, stored and retrieved.
> Different paths are used for obtaining information for schedules.
> Corrective action is implemented to improve quality of project work.
> Reports are used in providing administrative and financial control of the business.

6.
> Tasks are prioritised to meet project deadlines.
> Analyses of work requirements are compared with relevant business plans and microenvironment.
> Potential risks that may affect project performance are recognised and appropriate actions are taken.
> Legislation that may impact on the work environment is identified and actions are taken to direct work activities to comply with the legislation.
> Requirements are ordered and procured in advance of being required.

For award of the whole qualification, candidates must achieve the required number of credits as specified in the rules of combination in point **15** as well as the criteria specified for integrated assessment in point 18 below.

Should candidates exit the qualification without completing the whole qualification, recognition may be given for each Exit Level Outcome achieved. For award of a particular Exit Level Outcome, candidates must achieve:

> All the Core and Elective unit standards associated with the particular Exit Level Outcome as per the specifications contained within each unit standard.
> The criteria specified for integrated assessment in point 18 below.

Integrated assessment:

Assessment will take place according to the detailed specifications indicated in the unit standards associated with each exit level outcome.

Over and above the achievement of the specified unit standards, evidence of integration will be required as per the following broad criteria, all within the context of workplace activities.

Assessors should note that the evidence of integration (as below) could well be presented by candidates when being assessed against the unit standards - thus there should not necessarily be separate assessments for each unit standard and then further assessment for integration. Well designed assessments should make it possible to gain evidence against each unit standard while at the same time gain evidence of integration.

Candidates must demonstrate the ability to engage in the operations selected in an integrative way, dealing with divergent and "random" demands related to these work operations, effectively. Evidence is required that the candidate is able to achieve the purpose of the qualification as a whole at the time of the award of the qualification. Integration of skills will be demonstrated through the achievement of the core operational

standards.

Assessment principles:

Assessment should be in accordance with the following general and specific principles:

> The initial assessment activities should focus on gathering evidence in terms of the main outcomes expressed in the titles of the unit standards to ensure assessment is integrated rather than fragmented. Where assessment at title level is unmanageable, then the assessment can focus on each specific outcome, or groups of specific outcomes. Take special note of the need for integrated assessment.

> Evidence must be gathered across the entire range specified in each unit standard, as applicable. Assessment activities should be as close to the real performance as possible, and where simulations or role-plays are used, there should be supporting evidence to prove that the candidate is able to perform in the real situation.

> All assessments should be conducted in accordance with the following universally accepted principles of assessment:
> Use appropriate, fair and manageable methods that are integrated into real work-related or learning situations.
> Judge evidence on the basis of its validity, currency, authenticity and sufficiency.
> Ensure assessment processes are systematic, open and consistent.

INTERNATIONAL COMPARABILITY

,This qualification and the component unit standards have been compared with similar qualifications from the following countries:

.> New Zealand.
> Australia.

The New Zealand qualification, "National certificate in Lifts and Escalators - level 4" has strands in installation and servicing. Installation strand consists of a total of 265 credits, and servicing strand consists of 283 credits.

The Australian qualification, "National Diploma in Lift Systems (Technician)" has 70 credits and is geared towards a lift mechanic.

Neither of these unit standards based qualifications represent the requirements of the lifts industry in South Africa, therefore this qualification was developed from scratch.

ARTICULATION OPTIONS

This qualification has been designed and structured so that qualifying learners can move from one context to another. It builds on the National Certificate in Lift Mechanics (Level 4) and acts as a springboard from which learners may progress to other qualifications in the engineering industry.

Employers or institutions should be able to evaluate the outcomes of this qualification against the needs of their context and structure top-up learning appropriately.

The following table shows the location of this qualification in terms of other qualifications within the engineering field.

NQF Level; Mechanical Engineering; Lifts; Electrical Engineering:
6; ND Mechanical Engineering; ; ND Electrical Engineering
5; NC Mechanical Engineering; NC Lift Inspection; NC Electrical Engineering
4; ; NC Lift Mechanics; ;

Learners can move vertically or horizontally by using this qualification as the basis for any of the qualifications indicated at or above level 5. This qualification comprises some engineering based unit standards and learners will be able to enter either mechanical or electrical engineering programmes.

Structure of the qualification:

The qualification has the following general structure:

The rationale and purpose provides, among other things, a broad description of what holders of the qualification can do.

The qualification is further defined by means of a number of Exit-Level Outcomes. These ELOs provide a means for candidates to exit the qualification with recognition for clusters of competencies, even if they do not achieve the whole qualification. The ELOs also provide a means to organise the unit standards into coherent clusters, thus facilitating integrated assessment.

Each ELO is further defined by means of the associated unit standards. Some of these unit standards may be indicated as core (compulsory), while others may be identified as electives, with rules of combination provided. Assessment criteria are provided for each ELO where required, mainly to address the need for evidence of integration of competencies.

Each unit standard contains details of specific outcomes, range statements and assessment criteria, thus making it possible for assessors to judge competence in terms of each unit standard, while at the same time providing possible evidence of integration of competencies.

MODERATION OPTIONS

> Providers offering learning towards achievement of any of the unit standards that make up this qualification must be accredited through the relevant ETQA.

> Internal moderation of assessment must take place at the point of assessment with external moderation provided by the relevant ETQA in conjunction with the Lift Industry, according to the moderation guidelines and the agreed ETQA procedures.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

Assessors registered with the relevant ETQA and/or the Lifts Industry must carry out the assessment of candidates for any of the unit standards that make up this qualification. The following criteria are specified for assessors concerning the technical aspects of the qualification:

> An appropriate qualification with at least eight years experience in a lift environment.
> Appropriate experience and understanding of assessment theory, processes and practices.
> Good interpersonal skills and ability to balance the conflicting requirements of the interests of the learner, the provider and the employer.

NOTES

N/A

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

	UNIT STANDARD ID AND TITLE	LEVEL	CREDITS	STATUS
core	**10133** Schedule project activities to facilitate effective project execution	Level 4	8	Reregistered
Core	**10144** Identify, suggest and implement corrective actions to improve quality	Level 4	6	Reregistered
Core	**13781** Release entrapped passengers from immobile lift	Level 4	4	Draft - Prep for P Comment
Core	**119256** Inspect and test electrical circuits	Level 4	6	Draft - Prep for P Comment
core	**119257** Produce and maintain work activity reports	Level 4	8	Draft - Prep for P Comment
core	**119246** Inspect and test escalator and passenger conveyor equipment	Level 5	12	Draft - Prep for P Comment
core	**119249** Inspect and test lift car and counterweight equipment	Level 5	5	Draft - Prep for P Comment
Core	**119268** inspect and test lift machine room equipment	Level 5	15	Draft - Prep for P Comment
core	**119269** Inspect and test lift well equipment	Level 5	5	Draft - Prep for P Comment
core	**119270** Inspect and test lift pit equipment	Level 5	3	Draft - Prep for P Comment
Elective	**10141** Contribute to the management of project risk within own field of expertise	Level 4	5	Reregistered
Elective	**10142** Fulfill procurement activities and supervise procurement administration	Level 4	8	Reregistered

Elective	13941	Apply the budget function in a business unit	Level 4	5	Registered
Elective	114592	Produce business plans for a new venture	Level 4	8	Registered
Elective	15231	Create and use a range of resources to effectively manage teams, sections, departments or divisions	Level 5	4	Registered
Elective	15234	Apply efficient time management to the work of a department/division/section	Level 5	4	Registered
Fundamental	9015	Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life related problems	Level 4	6	Reregistered
Fundamental	7866	Plan, organise and monitor work in own area of responsibility	Level 5	3	Reregistered
Fundamental	8647	Apply workplace communication skills	Level 5	10	Reregistered
Fundamental	12432	Use mathematical and statistical techniques effectively	Level 5	20	Registered
Fundamental	12433	Use communication techniques effectively	Level 5	8	Registered
Fundamental	15225	Identify and interpret related legislation and its impact on the team, department or division and ensure compliance	Level 5	4	Registered

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 1

Conduct dye penetrant testing

SAQA US ID	*UNIT STANDARD TITLE*		
119235	Conduct dye penetrant testing		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	4	Level 3	Regular

SPECIFIC OUTCOME 1

Set-up dye penetrant testing equipment.

SPECIFIC OUTCOME 2

Perform dye penetrant testing.

SPECIFIC OUTCOME 3

Record and classify the results of the tests.

SPECIFIC OUTCOME 4

Report the results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 2

Conduct magnetic particle testing

SAQA US ID	***UNIT STANDARD TITLE***		
1**19253**	Conduct magnetic particle testing		
SGB NAME		***NSB 06***	***PROVIDER NAME***
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		***FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	**4**	Level **3**	Regular

SPECIFIC OUTCOME 1

Set-up magnetic particle testing equipment.

SPECIFIC OUTCOME 2

Perform magnetic particle testing.

SPECIFIC OUTCOME 3

Record and classify the results of the tests.

SPECIFIC OUTCOME 4

Report the results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 3

Conduct eddy current testing

SAQA US ID	*UNIT STANDARD TITLE*	
119245	Conduct eddy current testing	
SGB NAME	*NSB 06*	*PROVIDER NAME*
SGB Engineering	Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE	*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND / *CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined / 8	Level 4	Regular

SPECIFIC OUTCOME 1

Set-up eddy current equipment.

SPECIFIC OUTCOME 2

Perform eddy current testing.

SPECIFIC OUTCOME 3

Record and classify the results of the tests.

SPECIFIC OUTCOME 4

Report the results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **4**

Conduct magnetic particle inspection

SAQA US ID	*UNIT STANDARD TITLE*		
119232	Conduct magnetic particle inspection		
SGB NAME		***NSB 06***	***PROVIDER NAME***
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		***FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	6	Level 4	Regular

SPECIFIC OUTCOME 1

Translate MT Codes, Specifications and Procedures into practical work instructions adapted to the actual working conditions.

SPECIFIC OUTCOME 2

Set up and verify equipment.

SPECIFIC OUTCOME 3

Perform and supervise testing.

SPECIFIC OUTCOME 4

Interpret and evaluate results.

SPECIFIC OUTCOME 5

Organise and report results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 5

Conduct radiographic testing

SAQA US ID	UNIT STANDARD TITLE		
119239	Conduct radiographic testing		
SGB NAME		NSB 06	PROVIDER NAME
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	8	Level 4	Regular

SPECIFIC OUTCOME 1

Set-up radiographic testing equipment.

SPECIFIC OUTCOME 2

Perform radiographic testing.

SPECIFIC OUTCOME 3

Record and classify the results of the tests.

SPECIFIC OUTCOME 4

Report the results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT ***STANDARD:*** **6**

Conduct ultrasonic testing

SAQA US ID	*UNIT STANDARD TITLE*		
19243	Conduct ultrasonic testing		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	*8*	Level 4	Regular

SPECIFIC OUTCOME **1**

Set-up ultrasonic testing equipment.

SPECIFIC OUTCOME 2

Perform ultrasonic testing.

SPECIFIC OUTCOME **3**

Record and classify the results of the tests.

SPECIFIC OUTCOME 4

Report the results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **7**

Inspect and test electrical circuits

SAQA US ID	*UNIT STANDARD TITLE*		
119256	Inspect and test electrical circuits		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	11	Level 4	Regular

SPECIFIC OUTCOME 1

Read and interpret electric circuit diagrams.

SPECIFIC OUTCOME **2**

Prepare the work area.

SPECIFIC OUTCOME **3**

Inspect electrical circuits.

SPECIFIC OUTCOME **4**

Test electrical circuits.

SPECIFIC OUTCOME **5**

Complete work activities.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: ***8***

Perform and evaluate liquid penetrant testing

SAQA US ID	*UNIT STANDARD TITLE*		
119237	Perform and evaluate liquid penetrant testing		
SGB NAME		***NSB 06***	***PROVIDER NAME***
SGB Engineering		Manufacturing, Engineering and Technology	
NIT STANDARD TYPE		***FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	**6**	Level **4**	Regular

SPECIFIC OUTCOME 1

Translate **P.T.** Codes, Specifications and Procedures into practical work instructions,

SPECIFIC OUTCOME 2

Verify the process and equipment.

SPECIFIC OUTCOME 3

Supervise and perform inspections.

***SPECIFIC OUTCOME* 4**

Interpret and evaluate inspection results.

***SPECIFIC OUTCOME* 5**

Organise and report results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 9

Produce and maintain work activity reports

SAQA US ID	UNIT STANDARD TITLE		
119257	Produce and maintain work activity reports		
SGB NAME		**NSB 06**	**PROVIDER NAME**
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		**FIELD DESCRIPTION**	**SUBFIELD DESCRIPTION**
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	**CREDITS**	**NQF LEVEL**	**UNIT STANDARD TYPE**
Undefined	8	Level 4	Regular

SPECIFIC OUTCOME 1

Gather information for reports.

***SPECIFIC OUTCOME* 2**

Write reports.

***SPECIFIC OUTCOME* 3**

Maintain reports.

***SPECIFIC OUTCOME* 4**

Distribute and follow-up on reports.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 10

Release entrapped passengers from immobile lift

SAQA US ID	*UNIT STANDARD TITLE*		
13781	Release entrapped passengers from immobile lift		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular-Provider		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	4	Level 4	Regular-Provider

SPECIFIC OUTCOME 1

Plan work activities.

SPECIFIC OUTCOME 2

Prepare work area,

SPECIFIC OUTCOME 3

Release entrapped passengers.

SPECIFIC OUTCOME 4

Complete work activities.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 11

Apply the ISO document "guide to the expression of uncertainty in measurement" to estimate uncertainty of measurement

SAQA US ID	*UNIT STANDARD TITLE*
119255	Apply the ISO document "guide to the expression of uncertainty in measurement" to estimate uncertainty of measurement

SGB NAME	*NSB 06*	*PROVIDER NAME*
SGB Engineering	Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE	***FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design

ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	5	Level 5	Regular

SPECIFIC OUTCOME 1

Define and explain the concepts and methodology of uncertainty of measurement.

SPECIFIC OUTCOME 2

Analyse the basic contributors *to* uncertainty of measurement.

SPECIFIC OUTCOME **3**

Estimate the uncertainty of measurement.

SPECIFIC OUTCOME **4**

Evaluate and record the estimate of uncertainty of measurement.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 12

Calibrate oscilloscopes

SAQA US ID	*UNIT STANDARD TITLE*		
119248	Calibrate oscilloscopes		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	18	Level 5	Regular

SPECIFIC OUTCOME 1

Maintain oscilloscope calibration reference standards.

SPECIFIC OUTCOME 2

Calibrate oscilloscope display.

SPECIFIC OUTCOME 3

Calibrate oscilloscope vertical systems.

SPECIFIC OUTCOME 4

Calibrate oscilloscope horizontal systems.

SPECIFIC OUTCOME 5

Calibrate oscilloscope trigger systems.

SPECIFIC OUTCOME 6

Calibrate oscilloscope Z-axis system.

SPECIFIC OUTCOME 7

Calibrate oscilloscope X-Y system.

SPECIFIC OUTCOME 8

Record, evaluate and report results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 13

Conduct nondestructive eddy current testing

SAQA US ID	*UNIT STANDARD TITLE*		
119250	Conduct non-destructive eddy current testing		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	"	Level 5	Regular

SPECIFIC OUTCOME 1

Translate ET Codes, Specifications and Procedures into practical work instructions adapted to the actual working conditions.

SPECIFIC OUTCOME 2

Set up and verify equipment for eddy current testing.

SPECIFIC OUTCOME 3

Perform and supervise testing.

SPECIFIC OUTCOME 4

Interpret and evaluate results.

SPECIFIC OUTCOME 5

Organize and report results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 14

Conduct nondestructive radiographic tests

SAQA US ID	UNIT STANDARD TITLE		
119247	Conduct non-destructive radiographic tests		
SGB NAME		NSB 06	PROVIDER NAME
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	12	Level 5	Regular

SPECIFIC OUTCOME 1

Translate NDT procedures into practical testing instructions adapted to the actual working conditions.

SPECIFIC OUTCOME 2

Set up and verify equipment for radiography.

SPECIFIC OUTCOME 3

Perform and supervise testing.

SPECIFIC OUTCOME 4

Interpret and evaluate results.

SPECIFIC OUTCOME 5

Organise and report results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 15

Conduct non-destructive ultrasonic testing

SAQA US ID	UNIT STANDARD TITLE		
119252	Conduct non-destructive ultrasonic testing		
SGB NAME		NSB 06	PROVIDER NAME
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, ,Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	12	Level 5	Regular

SPECIFIC OUTCOME 1

Translate UT Codes, Specifications and Procedures into practical work instructions adapted to the actual working conditions.

SPECIFIC OUTCOME 2

Set-up and verify equipment for ultrasonic testing.

SPECIFIC OUTCOME 3

Perform and supervise testing.

SPECIFIC OUTCOME 4

Interpret and evaluate results.

SPECIFIC OUTCOME 5

Organise and report results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 16

Define the role, functions and operation of the international measurement system

SAQA US ID	*UNIT STANDARD TITLE*		
119238	Define the role, functions and operation of the international measurement system		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	1	Level 5	Regular

***SPECIFIC OUTCOME* 1**

Define the structure, role and function *of* the international measurement system.

***SPECIFIC OUTCOME* 2**

Explain the derivation of accuracy traceability from SI units.

***SPECIFIC OUTCOME* 3**

Explain the relationship between the international measurement system and quality systems.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **17**

Develop calibration and test methods and procedures

SAQA US ID	*UNIT STANDARD TITLE*		
119241	Develop calibration and test methods and procedures		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	3	Level 5	Regular

SPECIFIC OUTCOME 1

Define and explain the need for measurement methods/procedures.

SPECIFIC OUTCOME **2**

Develop a basic measurement procedure.

SPECIFIC OUTCOME **3**

Validate the measurement method.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **18**

Establish and manage a tesffcalibration laboratory

SAQA US ID	*UNIT STANDARD TITLE*		
119242	Establish and manage a test/calibration laboratory		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	7	Level 5	Regular

SPECIFIC OUTCOME 1

Define, clarify and explain the concepts of strategic management, financial management and business planning.

SPECIFIC OUTCOME 2

Generate a business plan for the successful establishment of a selected test/calibration laboratory.

SPECIFIC OUTCOME 3

Evaluate the feasibility of the business plan for the successful establishment of a selected testlcalibration laboratory.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 19

Implement a quality system to ensure technically valid measurement results in accordance with ISO/IEC 17025

SAQA US ID	*UNIT STANDARD TITLE*		
119244	Implement a quality system to ensure technically valid measurement results in accordance with ISO/IEC 17025		
SGB *NAME*		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNITSTANDARD TYPE*
Undefined	6	Level 5	Regular

SPECIFIC OUTCOME **1**

Explain why a Quality System is required to ensure technically valid measurement results.

SPECIFIC OUTCOME **2**

Describe and clarify the management and technical requirements for a measurement quality system.

SPECIFIC OUTCOME **3**

Develop a measurement quality system for a given specific laboratory environment.

SPECIFIC OUTCOME **4**

Apply various assessment methods to evaluate the effectiveness of the implemented measurement quality system.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 20

inspect and test escalator and passenger conveyor equipment

SAQA US ID	UNIT STANDARD TITLE
119246	Inspect and test escalator and passenger conveyor equipment

SGB NAME		NSB 06	PROVIDER NAME
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		**FIELD DESCRIPTION**	**SUBFIELD DESCRIPTION**
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	**CREDITS**	**NQF LEVEL**	**UNIT STANDARD TYPE**
Undefined	12	Level 5	Regular

SPECIFIC OUTCOME 1

Plan work activities.

SPECIFIC OUTCOME 2

Prepare work area.

SPECIFIC OUTCOME 3

Inspect and test escalator and passenger conveyor equipment.

SPECIFIC OUTCOME 4

Complete work activities.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 21

Inspect and test lift car and counterweight equipment

SAQA US ID	UNIT STANDARD TITLE		
119249	Inspect and test lift car and counterweight equipment		
SGB NAME		NSB 06	PROVIDER NAME
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	5	Level 5	Regular

SPECIFIC OUTCOME 1

Plan work activities.

SPECIFIC OUTCOME 2

Prepare work area.

SPECIFIC OUTCOME 3

Inspect and test lift car and counterweight equipment.

SPECIFIC OUTCOME 4

Complete work activities.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 22

Inspect and test lift machine room equipment

SAQA US ID	*UNIT STANDARD TITLE*		
119268	Inspect and test lift machine room equipment		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	15	Level 5	Regular

SPECIFIC OUTCOME 1

Plan work activities.

SPECIFIC OUTCOME 2

Prepare work area.

SPECIFIC OUTCOME 3

Inspect and test lift machine room equipment.

SPECIFIC OUTCOME 4

Complete work activities.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **23**

Inspect and test lift pit equipment

SAQA US ID	*UNIT STANDARD TITLE*		
119270	Inspect and test lift pit equipment		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	3	Level 5	Regular

SPECIFIC OUTCOME 1

Plan work activities.

SPECIFIC OUTCOME **2**

Prepare work area.

SPECIFIC OUTCOME **3**

Inspect and test lift pit equipment.

SPECIFIC OUTCOME **4**

Complete work activities.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **24**

Inspect and test lift well equipment

SAQA US ID	*UNIT STANDARD TITLE*		
119269	Inspect and test lift well equipment		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	5	Level 5	Regular

SPECIFIC OUTCOME 1

Plan work activities.

SPECIFIC OUTCOME 2

Prepare work area.

SPECIFIC OUTCOME **3**

Inspect and test lift well equipment.

SPECIFIC OUTCOME **4**

Complete work activities.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 25

Measure frequency using frequency counters.

SAQA US ID	*UNIT STANDARD TITLE*		
119251	Measure frequency using frequency counters.		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	3	Level 5	Regular

SPECIFIC OUTCOME 1

Understand the fundamentals of frequency measurement.

SPECIFIC OUTCOME 2

Measure frequency using a reference frequency counter.

SPECIFIC OUTCOME 3

Record and evaluate results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 26

Perform AC electrical and AC/DC transfer measurements and calibrate devices

SAQA US ID	*UNIT STANDARD TITLE*		
119240	Perform AC electrical and AC/DC transfer measurements and calibrate devices		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	17	Level 5	Regular

SPECIFIC OUTCOME 1

Maintain AC Electrical and AC/DC Transfer reference standards.

SPECIFIC OUTCOME 2

Derive, generate and measure AC Electrical and AC/DC Transfer quantities and calibrate devices.

SPECIFIC OUTCOME 3

Record, evaluate and report results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 27

Perform AC power and eergy measurements and calibrate devices

SAQA US ID	***UNIT STANDARD TITLE***		
119258	Perform **AC** power and eergy measurements and calibrate devices		
SGB NAME		***NSB 06***	***PROVIDER NAME***
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		***FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefinsd	12	Level 5	Regular

SPECIFIC OUTCOME 1

Maintain **AC** Power and Energy reference standards.

SPECIFIC OUTCOME 2

Derive, generate and measure **AC** Power and Energy quantities and calibrate devices.

SPECIFIC OUTCOME 3

Record, evaluate and report results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 28

Perform DC electrical and resistance measurements and calibrate devices,

SAQA US ID	UNIT STANDARD TITLE
119254	Perform **DC** electrical and resistance measurements and calibrate devices.

SGB NAME	NSB 06	PROVIDER NAME
SGB Engineering	Manufacturing, Engineering and Technology	

UNIT STANDARD TYPE	FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design

ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	**17**	Level **5**	Regular

SPECIFIC OUTCOME **1**

Maintain DC electrical and Resistance reference standards.

SPECIFIC OUTCOME 2

Derive, generate and measure DC electrical and Rssistance quantities and calibrate electric:?! devices.

SPECIFIC OUTCOME **3**

Record, evaluate and report results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 29

Perform impedance measurements and calibrate devices

SAQA US ID	*UNIT STANDARD TITLE*		
119233	Perform impedance measurements and calibrate devices		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	12	Level 5	Regular

SPECIFIC OUTCOME 1

Maintain Impedance reference standards.

SPECIFIC OUTCOME 2

Derive, generate and measure Impedance quantities and calibrate devices.

SPECIFIC OUTCOME 3

Record, evaluate and report results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 30

Perform temperature measurements using secondary temperature standards

SAQA US ID	UNIT STANDARD TITLE		
119234	Perform temperature measurements using secondary temperature standards		
SGB NAME		**NSB 06**	**PROVIDER NAME**
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		**FIELD DESCRIPTION**	**SUBFIELD DESCRIPTION**
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	**CREDITS**	**NQF LEVEL**	**UNIT STANDARD TYPE**
Undefined	**6**	Level 5	Regular

SPECIFIC OUTCOME 1

Understand the fundamentals of temperature.

SPECIFIC OUTCOME 2

Measure temperature using laboratory reference thermometer.

SPECIFIC OUTCOME 3

Record and evaluate results.

SPECIFIC OUTCOME 4

Apply corrections for temperature to metrological quantities measured, when required.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 31

Report measurement results

SAQA US ID	*UNIT STANDARD TITLE*		
119236	Report measurement results		
SGB NAME		*NSB 06*	*PROVIDER NAME*
SGB Engineering		Manufacturing, Engineering and Technology	
UNIT STANDARD TYPE		*FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	3	Level 5	Regular

SPECIFIC OUTCOME 1

Identify the needs for measurement reports/certificates.

SPECIFIC OUTCOME 2

Interpret the requirements for measurement reports/certificates.

SPECIFIC OUTCOME 3

Generate a measurement report/certificate.