# GOVERNMENT NOTICES

## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**No. 217** **2 March 2009**

### 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

**Civil Engineering Construction**

registered by Organising Field 12 – Physical Planning and Construction, publishes the following Qualifications and Unit Standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the Qualifications and Unit Standards. The full Qualifications 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, SAQA House, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the Qualifications and Unit Standards should reach SAQA at the address below and ***no later than 2 April 2009.*** All correspondence should be marked **Standards Setting – SGB for Civil Engineering Construction** and addressed to

The Director: Standards Setting and Development
SAQA
*Attention: Mr. E. Brown*
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**D. MPHUTHING**
**ACTING DIRECTOR: STANDARDS SETTING AND DEVELOPMENT**

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***QUALIFICATION:***
***National Certificate: Construction: Steelwork***

| *SAQA QUAL ID* | *QUALIFICATION TITLE* | | |
|---|---|---|---|
| 65709 | National Certificate: Construction: Steelwork | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *QUALIFICATION TYPE* | *FIELD* | *SUBFIELD* | |
| National Certificate | 12 - Physical Planning and Construction | Civil Engineering Construction | |
| *ABET BAND* | *MINIMUM CREDITS* | *NQF LEVEL* | *QUAL CLASS* |
| Undefined | 120 | Level 3 | Regular-Unit Stds Based |

***This qualification replaces:***

| Qual ID | Qualification Title | NQF Level | Min Credits | Replacement Status |
|---|---|---|---|---|
| 49012 | National Certificate: Construction: Concrete Reinforcing | Level 3 | 120 | Will occur as soon as 65709 is registered |
| 49015 | National Certificate: Construction: Structural Steel Erecting | Level 3 | 153 | Will occur as soon as 65709 is registered |

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

Learners found competent against this qualification will be able to install concrete reinforcing or steel structures in a safe, cost effective manner and in compliance with project specifications.

For those who have been in the workplace for a long time, this Qualification can be used in the recognition of prior learning process to assess and recognise workplace skills acquired without the benefit of formal education and training.

For the new entrant, this Qualification describes the learning outcomes required to participate effectively in a structured workplace. For education and training providers, this Qualification provides guidance for the development of appropriate learning programmes and assessment documentation. For employers, this Qualification enables skills gaps to be identified and addressed ensuring that productivity levels are increased and business objectives achieved.

This Qualification has been developed to assist with the advancement of the learner across the Civil Engineering and Construction Industry and is aimed at Construction Concrete Reinforcing practitioners and Structural Steel Erectors in the Industry, ensuring the upliftment of standards in general.

The combination of learning outcomes will provide the qualifying learner with vocational knowledge and skills appropriate to the context of Civil Engineering Construction environment. It will also equip learners with a foundation for further intellectual development, opportunities for gainful employment and reward for contributions to society.

This Qualification will provide the Industry with qualified Construction Concrete Reinforcing practitioners, thereby facilitating social and economic transformation, empowerment and upliftment in the Industry and country in general.

Qualifying learners will be capable of:

> Applying health, safety and environmental requirements during steelwork operations.
> Performing steelwork operation related administration.
> Preparing for the installation of steel structures or concrete reinforcing.

Rationale:

This Qualification has been developed for the Construction Steelwork occupational area within the Civil Engineering Construction Industry that focuses on installation of concrete reinforcing and steel structures. It will continue to provide a unit standards based approach for persons who perform construction concrete reinforcing and steel erecting activities on Civil Engineering Construction sites, whether in micro, small, medium or large operations.

In the past many practitioners in the Civil Engineering and Construction area were denied career advancement and possible professional registration. This National Certificate in Construction: Steelwork will allow learners, both unemployed and employed, to reach their full potential of advancement and will allow for Recognition of Prior Learning. It will also serve to facilitate the development of a professional community of Construction Concrete Reinforcing practitioners.

The competencies contained in this Qualification are essential for social and economic transformation, empowerment and upliftment within the construction steelwork environment, whilst simultaneously improving the skills base of the country.

***RECOGNIZE PREVIOUS LEARNING?***
Y

***LEARNING ASSUMED IN PLACE***
It is assumed that learners are already competent in the following:

> Communication at NQF Level 2.
> Mathematical literacy at NQF Level 2.

Recognition of Prior Learning:

> The structure of this Unit Standard based Qualification makes the Recognition of Prior Learning possible, if the learner is able to demonstrate competence at the level of unit standards and exit level outcomes as described.

Access to the Qualification:

> Access to this qualification is open bearing in mind learning assumed to be in place.

***QUALIFICATION RULES***
The Qualification consists of a Fundamental, a Core and an Elective Component:

> All Unit Standards in the Fundamental Component, totaling 36 Credits are compulsory.
> All Unit Standards in the Core Component, totaling 36 credits are compulsory.
> For the Concrete Reinforcing stream all 36 credits and a selection of a minimum of 12 credits from the generic electives must be achieved to acquire a minimum of 120 credits for the award of the qualification.
> For the Structural Steel stream all 24 credits and a selection of a minimum of 24 credits from the generic electives must be achieved to acquire a minimum of 120 credits for the award of the qualification.

The qualifying learner will select one of the two following clusters of unit standards related to each stream.

The Concrete Reinforcing Installation stream comprises the following Elective Unit Standards:

> Assemble, tie and install reinforcing cages, NQF Level 2, 12 credits.
> Interpret, read and apply reinforcing drawings, NQF Level 4, 10 credits.
> Operate and maintain a reinforcing bending machine, NQF Level 3, 7 credits.
> Operate and maintain a reinforcing cutting machine, NQF Level 3, 7 credits.

The Steel Structure Installation stream comprises the following Elective Unit Standards:

> Plan and prepare for the erection of structural steelwork, NQF Level 3, 10 credits.
> Finish off and hand over structural works, NQF Level 3, 6 credits.
> Guide and position loads, NQF Level 3, 6 credits.
> Align a steel structure using a dumpy level, NQF Level 3, 2 credits.

***EXIT LEVEL OUTCOMES***
1. Apply health, safety and environmental requirements during steelwork operations.

2. Perform steelwork operation related administration.

3. Prepare for the installation of steel structures or concrete reinforcing.

***ASSOCIATED ASSESSMENT CRITERIA***
Assessment Criteria for Exit Level Outcome 1:

1.1 The principles and provisions of the Occupational Health and Safety Act, the National Environment Management Act and the Environment Conservation Act are explained in the context of steelwork operations.
1.2 Contribute to the implementation of a Health and Safety Plan for the site of steelwork operations in accordance with legislative requirements.
1.3 Primary emergency life support is demonstrated according to a given steelwork operations scenario, assistance is summoned and a report compiled according to worksite procedures.

Assessment Criteria for Exit Level Outcome 2:

2.1 A work plan is developed according to the calculated quantities and production rates in relation to a particular structural steel or concrete reinforcing civil engineering project.
2.2 Materials, tools and equipment is procured in relation to a particular structural steel or concrete reinforcing civil engineering project and organisational procedures.
2.3 Time sheets and log sheets are maintained in accordance with organisational and statutory requirements.
2.4 Steelwork operations related documents are completed, recorded and stored according to organisational procedures.

Assessment Criteria for Exit Level Outcome 3:

3.1 The scope and nature of the construction industry is explained in the South African context.
3.2 Specifications and drawings are interpreted to prepare for site establishment according to organisational procedures.
3.3 Work area is prepared and established for steelwork according to organisational procedures.
3.4 Measures to prevent hazards related to working in confined spaced are implemented according to organisational and statutory requirements.

Integrated Assessment:

Because assessment practices must be open, transparent, fair, valid, and reliable and ensure that no learner is disadvantaged in any way whatsoever, an integrated assessment approach is incorporated into the qualification.

Learning, teaching and assessment are inextricably lined. Whenever possible, the assessment of knowledge, skills, attitudes and values shown in the unit standards should be integrated.

Assessment of the communication, language, literacy and numeracy should be conducted in conjunction with other aspects and should be assessed in authentic Computer Aided Drawing contexts wherever possible.

A variety of methods must be used in assessment and tools and activities must be appropriate to the context in which the learner is working. Where it is not possible to assess the learner in the workplace or on-the-job, simulations, case studies, role-plays and other similar techniques should be used to provide a context appropriate to the assessment.

The term 'Integrated Assessment' implies that theoretical and practical components should be assessed together. During integrated assessments the assessor should make use of formative and summative assessment methods and assess combinations of practical, applied, foundational and reflective competencies.

Assessors and moderators should make 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.

Assessment should ensure that all specific outcomes, embedded knowledge and critical cross-field outcomes are evaluated. The assessment of the critical cross-field outcomes should be integrated with the assessment of specific outcomes and embedded knowledge.

***INTERNATIONAL COMPARABILITY***

Traditionally there has always been dedicated education and training worldwide to cater for the needs of Steel Structure Erecting and Reinforced Concrete Installing. This has been the case in the South African context as well with separate qualifications for each of these occupations in the Civil Engineering Construction industry. The National Certificate in Construction: Steelworks has made a break from this tradition by combining these streams or strands of learning as the core component of these qualifications reflect common competencies.

The criteria for the registration of qualifications and the nature of the South African NQF make such a combined qualification possible, however, no similar examples were found for this international benchmarking exercise. Therefore qualifications dedicated to each of the streams of Reinforced concrete installing and Steel structure erecting were considered.

An example of such a qualification is the offering in the United Kingdom, the Level 2 NVQ in Constructional Steelwork Site Operations (Ref. 100/5885/0) that requires the achievement of 10 mandatory and 4 optional units. In comparison to the South African unit standards, the following units from this qualification were found to reflect similarities in terms of complexity of learning, chunk size of learning, learning duration and learning outcomes:

> Work safely, minimize risk and comply with emergency procedures.
> Identify and deal with hazards in the work environment.
> Position and erect steel structures.
> Erect structural steel sections.
> Dismantle structural steel sections.

> Determine resource requirements to achieve steel erecting.
> Prepare work areas for steel erecting activities.
> Prepare materials required for steel erecting activities.
> Prepare equipment required for steel erecting activities.
> Check that the steel structure is installed to specification.
> Determine technical requirements to achieve steel erecting objectives.

Another example of such a dedicated qualification is the offering in New Zealand, the National Certificate in Concrete Construction, Level 3 with strands in Sitework, Pre-cast Concrete, and Placing and Finishing.

The following Core units of this qualification reflect similarities with the South African unit standards, specific outcomes and assessment criteria:

> Manage first aid in emergency situations, Level 3 (6400).
> Provide first aid, Level 2 (6401).
> Provide resuscitation Level 2, Level 1 (6402).
> Demonstrate knowledge of safe working practices on construction sites, Level 3 (12997).
> Carry out safe working practices on construction sites, Level 4 (13036).

The following units from the sitework strand of the qualification also reflect similarities with the concrete reinforcing elective stream of the National Certificate in Construction: Steelwork:

> Detail, cut and bend reinforcing steel for concrete construction (12026) 5 credits.
> Fix reinforcing steel for concrete (12027) 5 credits.
> Demonstrate knowledge of fabrication and placing of reinforcing steel and steel mesh (13009) 4 credits.

Conclusion:

While no qualification was found to compare with the National Certificate in Construction: Steelwork with elective streams in steel structure erecting and reinforced steel installing, some learning units were found to be similar. The detailed comparison above shows the extent of the similarity with qualifications that focus on steel structure erecting and qualifications for reinforced concrete installing.

***ARTICULATION OPTIONS***
The following are examples of horizontal and vertical articulation with this qualification:

Horizontal articulation:

> ID 49016: National Certificate in Construction Concreting, at NQF Level 3.
> ID 22312: National Certificate in Road Construction, at NQF Level 3.

Vertical articulation:

> ID 21149: Certificate: AutoCAD, at NQF Level 4.
> ID 49053: National Certificate in the Supervision of Construction Process, at NQF Level 4.

***MODERATION OPTIONS***
> Assessment of learner achievements takes place at providers accredited by relevant ETQA or any ETQA which has signed a Memorandum of Understanding (MoU) with the relevant ETQA in accordance with ETQA Regulations (RSA, 1998b).

> Anyone assessing a learner or moderating the assessment of a learner against this qualification must be registered as an assessor with the relevant Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding 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 Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding with the relevant ETQA.

> Assessment and moderation of assessment will be overseen by the relevant Education, Training, Quality, Assurance (ETQA) Body, or by an ETQA that has a Memorandum of Understanding with the relevant ETQA, according to the ETQA`s policies and guidelines for assessment and moderation.

> 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 as well as the integrated competence described in the Qualification.

> Anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution that is accredited by the relevant ETQA.

***CRITERIA FOR THE REGISTRATION OF ASSESSORS***
For an applicant to register as an assessor, the applicant needs:

> To be registered as an assessor with the relevant ETQA.
> To have a similar qualification at one level higher than the level of the qualification and a minimum of three years working experience in the relevant field.

***NOTES***
This qualification replaces the following qualifications:

> ID 49012: National Certificate: Construction: Concrete Reinforcing, Level 3, 120 Credits.
> ID 49015: National Certificate: Construction: Structural Steel Erecting, Level 3, 153 Credits.

***UNIT STANDARDS***

| | ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|---|---|---|---|---|
| Fundamental | 119472 | Accommodate audience and context needs in oral/signed communication | Level 3 | 5 |
| Fundamental | 9010 | Demonstrate an understanding of the use of different number bases and measurement units and an awareness of error in the context of relevant calculations | Level 3 | 2 |
| Fundamental | 9013 | Describe, apply, analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts | Level 3 | 4 |
| Fundamental | 119457 | Interpret and use information from texts | Level 3 | 5 |
| Fundamental | 9012 | Investigate life and work related problems using data and probabilities | Level 3 | 5 |
| Fundamental | 119467 | Use language and communication in occupational learning programmes | Level 3 | 5 |
| Fundamental | 7456 | Use mathematics to investigate and monitor the financial aspects of personal, business and national issues | Level 3 | 5 |
| Fundamental | 119465 | Write/present/sign texts for a range of communicative contexts | Level 3 | 5 |
| Core | 9966 | Establish and prepare a work area | Level 2 | 4 |
| Core | 14336 | Maintain records on a constuction site | Level 2 | 2 |
| Core | 120496 | Provide risk-based primary emergency care/first aid in the workplace | Level 2 | 5 |
| Core | 15034 | Work in confined spaces on construction sites | Level 2 | 2 |

| | ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|---|---|---|---|---|
| Core | 246667 | Demonstrate an understanding of Occupational Health, Safety and Environmental Legislations | Level 3 | 4 |
| Core | 261661 | Develop construction work plans | Level 3 | 8 |
| Core | 110095 | Interpret the composition, construction sequence and processes of the construction industry | Level 3 | 3 |
| Core | 261737 | Procure building and civil construction materials, tools and equipment | Level 3 | 8 |
| Elective | 9986 | Apply quality principles on a construction site | Level 2 | 12 |
| Elective | 262586 | Assemble, tie and install reinforcing cages | Level 2 | 12 |
| Elective | 13972 | Identify describe and use materials in civil engineering construction | Level 2 | 4 |
| Elective | 12463 | Understand and deal with HIV/AIDS | Level 2 | 3 |
| Elective | 244343 | Align a steel structure using a dumpy level | Level 3 | 2 |
| Elective | 262591 | Finish off steel structure and explain hand over procedures | Level 3 | 6 |
| Elective | 262592 | Guide the lifting and positioning of loads | Level 3 | 6 |
| Elective | 7786 | Operate a Computer | Level 3 | 8 |
| Elective | 262588 | Operate and maintain a reinforcing bending machine | Level 3 | 7 |
| Elective | 262589 | Operate and maintain a reinforcing cutting machine | Level 3 | 7 |
| Elective | 262590 | Plan and prepare for the erection of structural steelwork | Level 3 | 10 |
| Elective | 14416 | Implement a quality management system, project quality plan and a quality improvement process on a construction project | Level 4 | 10 |
| Elective | 262587 | Interpret, read and use reinforcing drawings | Level 4 | 10 |
| Elective | 14418 | Monitor and control cost and production of construction work activities and implement productivity improvements | Level 4 | 12 |
| Elective | 14428 | Set out construction work areas | Level 4 | 10 |
| Elective | 14429 | Supervise health and safety on a construction project | Level 4 | 6 |
| Elective | 116592 | Tension bonded tendons | Level 4 | 10 |
| Elective | 116593 | Tension unbonded tendons | Level 4 | 10 |

***LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION***
***None***

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Assemble, tie and install reinforcing cages***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262586 | Assemble, tie and install reinforcing cages | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 12 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116573 | Assemble, tie and fix reinforcing cages | Level 2 | 3 | Will occur as soon as 262586 is registered |

**SPECIFIC OUTCOME** 1
Describe types and uses of reinforcing.

**SPECIFIC OUTCOME** 2
Explain safety requirements of the work area.

**SPECIFIC OUTCOME** 3
Prepare to install reinforcing steel.

**SPECIFIC OUTCOME** 4
Install reinforcing.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65709 | National Certificate: Construction: Steelwork | Level 3 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Interpret, read and use reinforcing drawings***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262587 | Interpret, read and use reinforcing drawings | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 10 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116556 | Interpret and apply reinforcing drawings | Level 4 | 5 | Will occur as soon as 262587 is registered |
| 116578 | Read and interpret reinforcing materials documentation | Level 2 | 3 | Will occur as soon as 262587 is registered |

**SPECIFIC OUTCOME** 1
Identify and describe features of reinforcing drawings.

**SPECIFIC OUTCOME** 2
Use key drawings to locate structures on site.

**SPECIFIC OUTCOME** 3
Determine requirements for structures.

**SPECIFIC OUTCOME** 4
Plan work sequences.

**SPECIFIC OUTCOME** 5
Control the use of construction documentation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65709 | National Certificate: Construction: Steelwork | Level 3 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Operate and maintain a reinforcing bending machine***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262588 | Operate and maintain a reinforcing bending machine | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 3 | 7 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116569 | Operate and maintain a steel bending machine | Level 3 | 5 | Will occur as soon as 262588 is registered |

**SPECIFIC OUTCOME** 1
Prepare to bend reinforcing.

**SPECIFIC OUTCOME** 2
Bend reinforcing.

**SPECIFIC OUTCOME** 3
Conduct post bending operations.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65709 | National Certificate: Construction: Steelwork | Level 3 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate and maintain a reinforcing cutting machine***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262589 | Operate and maintain a reinforcing cutting machine | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 3 | 7 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116566 | Operate and maintain a steel cutting machine | Level 3 | 5 | Will occur as soon as 262589 is registered |

**SPECIFIC OUTCOME** 1
Prepare to cut reinforcing.

**SPECIFIC OUTCOME** 2
Cut reinforcing.

**SPECIFIC OUTCOME** 3
Conduct post cutting operations.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65709 | National Certificate: Construction: Steelwork | Level 3 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Plan and prepare for the erection of structural steelwork***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262590 | Plan and prepare for the erection of structural steelwork | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 3 | 10 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116615 | Plan and prepare for the erection of structural steelwork | Level 4 | 16 | Will occur as soon as 262590 is registered |

SPECIFIC OUTCOME 1
Understand the nature and scope of structural steel erecting.

SPECIFIC OUTCOME 2
Demonstrate an understanding of structural steel materials.

SPECIFIC OUTCOME 3
Use and maintain tools and safety equipment.

SPECIFIC OUTCOME 4
Perform planning and site establishment activities.

SPECIFIC OUTCOME 5
Assemble and prepare steel components for lifting.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65709 | National Certificate: Construction: Steelwork | Level 3 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Finish off steel structure and explain hand over procedures***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262591 | Finish off steel structure and explain hand over procedures | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 3 | 6 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116577 | Finish off and hand over structural works | Level 3 | 12 | Will occur as soon as 262591 is registered |

**SPECIFIC OUTCOME** 1
Carry out amendments to steel structures.

**SPECIFIC OUTCOME** 2
Finish off structural steel work.

**SPECIFIC OUTCOME** 3
Explain handover procedures.

**SPECIFIC OUTCOME** 4
Dismantle steel structures.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65709 | National Certificate: Construction: Steelwork | Level 3 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Guide the lifting and positioning of loads***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262592 | Guide the lifting and positioning of loads | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 3 | 6 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116622 | Lift and position loads | Level 3 | 12 | Will occur as soon as 262592 is registered |

**SPECIFIC OUTCOME** 1
Describe the nature and scope for lifting and positioning loads.

**SPECIFIC OUTCOME** 2
Prepare for lifting loads.

**SPECIFIC OUTCOME** 3
Guide the lifting of loads.

**SPECIFIC OUTCOME** 4
Position and secure loads.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65709 | National Certificate: Construction: Steelwork | Level 3 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***QUALIFICATION:***
***National Certificate: Construction Plant Operations***

| *SAQA QUAL ID* | *QUALIFICATION TITLE* | | |
|---|---|---|---|
| 65789 | National Certificate: Construction Plant Operations | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *QUALIFICATION TYPE* | *FIELD* | *SUBFIELD* | |
| National Certificate | 12 - Physical Planning and Construction | Civil Engineering Construction | |
| *ABET BAND* | *MINIMUM CREDITS* | *NQF LEVEL* | *QUAL CLASS* |
| Undefined | 120 | Level 2 | Regular-Unit Stds Based |

***This qualification replaces:***

| Qual ID | Qualification Title | NQF Level | Min Credits | Replacement Status |
|---|---|---|---|---|
| 48940 | National Certificate: Construction: Plant Operations | Level 2 | 133 | Will occur as soon as 65789 is registered |

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

This Qualification is intended to assist all relevant stakeholders and role-players, including:

> Civil and Building Construction companies.
> Plant Hire.
> Forestry.
> Material Handling.
> Mining.
> Plant manufacturers.

For those who have been in the workplace for a long time, this Qualification can be used in the recognition of prior learning process to assess and recognise workplace skills acquired without the benefit of formal education and training.

For the new entrant, this Qualification describes the learning outcomes required to participate effectively in a structured workplace. For education and training providers, this Qualification provides guidance for the development of appropriate learning programmes and assessment documentation.

For employers, this Qualification enables skills gaps to be identified and addressed ensuring that productivity levels are increased and business objectives achieved.

This Qualification has been developed to assist with the advancement of the learner across the Civil Engineering and Construction Industry and is aimed at Construction Plant Operations practitioners in the Industry, ensuring the upliftment of standards in general.

The combination of learning outcomes will provide the qualifying learner with vocational knowledge and skills appropriate to the context of Construction Plant Operations in the Civil

Engineering and Construction environment. It will also equip learners with a foundation for further intellectual development, opportunities for gainful employment and reward for contributions to society.

This Qualification will provide the Industry with qualified Construction Plant Operations practitioners, thereby facilitating social and economic transformation, empowerment and upliftment in the Industry and country in general.

Qualifying learners will be capable of:

> Applying health and safety principles in plant operations.
> Understanding plant operations in the construction environment.
> Performing plant operation related functions.
> Adhering to plant operation personnel procedures.
> Understanding mechanical and leverage principles to operate earthmoving, transport and/or ancillary plant.

Rationale:

The Civil Construction Industry is primarily engaged in the civil engineering work on infrastructure related projects covering such diverse fields as roads, bridgeworks, railways, harbours, sewerage and drainage, electrical infrastructure, pipelines and recreation works. There is a rising demand for qualified plant and machinery operators. Increasingly, contractors are demanding evidence of competence to nationally recognised standards. Rising customer expectations at all levels are driving up standards in plant and machinery operations and fuelling the demand for proven competence through qualifications.

This Qualification has been developed to serve this established function for the Construction Plant occupational area within the Civil Engineering and Construction Industry. The rationale for the introduction of a NQF Level 2 unit standards-based Qualification in Construction Operations is to provide a Qualification for persons who perform construction plant activities on Civil Engineering and Construction sites, whether in micro, small, medium or large operations.

In the past many practitioners in the Civil Engineering and Construction area were denied career advancement and possible professional registration. The introduction of a unit standards based National Certificate in Construction: Plant Operations will allow learners, both unemployed and employed, to reach their full potential of advancement and will allow for Recognition of Prior Learning and further learning.

This Qualification will facilitate the development of a professional community of Construction Plant Operators. The competencies contained in this Qualification are essential for social and economic transformation, empowerment and upliftment within the construction plant operations environment, whilst simultaneously improving the skills base of the country.

The combination of learning outcomes will provide qualifying learners with applied competence in the integration of general construction sitework and technical competencies in areas of specialisation in construction plant operations.

***RECOGNIZE PREVIOUS LEARNING?***
Y

***LEARNING ASSUMED IN PLACE***
It is recommended that a learner entering a programme leading to this Qualification has successfully completed a General Education and Training Certificate including, Communication and Mathematical literacy at NQF Level 1.

Recognition of Prior Learning:

The Qualification may be obtained in part or in whole through the process of Recognition of Prior Learning. Learners who successfully meet the requirements of any Unit Standard in this Qualification may apply to the relevant body for Recognition of Prior Learning (RPL) assessment. RPL candidates will be assessed against the assessment criteria and specific outcomes contained in the relevant Unit Standard/s.

Access to the Qualification:

> There are no access requirements for the achievement of this Qualification, however the learning assumptions described below must be considered.

***QUALIFICATION RULES***
In order to be awarded the Qualification, the learner has to prove competence in all of the Fundamental and Core Unit Standards, as well as at least 15 credits from Elective Unit Standards of the learner's choice.

The elective component of learning comprises specializations that are clustered into three types of plant viz. earthmoving, transport and ancillary plant. The learner must select at least one elective unit standard from two of these clusters for a minimum of 12 credits.

> Fundamental: 36 credits.
> Core: 71 credits.
> Elective: Minimum 13 credits.
> Min. Credit Total: 120 credits.

The following elective unit standards comprise the earthmoving area of specialisation:

> ID 262730: Operate a dragline, Level 2, 20 credits.
> ID 262735: Operate a grader, Level 2, 15 credits.
> ID 262710: Operate a scraper, Level 2, 12 credits.
> ID 262712: Operate a skid steer loader, Level 2, 8 credits.
> ID 262727: Operate backhoe/loader, Level 2, 15 credits.
> ID 262729: Operate a tracked dozer, Level 2, 15 credits.
> ID 262732: Operate continuous bucket trencher, Level 2, 15 credits.
> ID 262744: Operate an excavator, Level 2, 15 credits.
> ID 262746: Operate face shovel, Level 2, 15 credits.
> ID 262747: Operate front end loader, Level 2, 12 credits.
> ID 262713: Operate wheeled dozer, Level 2, 12 credits.
> ID 262728: Grade to final levels using a motor grader, Level 3, 16 credits.

The following elective unit standards comprise the transport area of specialisation:

> ID 262731: Operate a rigid body dump truck, Level 2, 10 credits.
> ID 262734: Operate a tip truck, Level 2, 8 credits.
> ID 262804: Operate a tractor, Level 2, 8 credits.
> ID 262745: Operate articulated dump truck, Level 2, 10 credits.
> ID 262790: Operate service truck, Level 2, 8 credits.
> ID 262764: Operate water cart, Level 2, 8 credits.

The following elective unit standards comprise the auxiliary area of specialisation:

> ID 262785: Operate bitumen spray equipment, Level 2, 5 credits.
> ID 262824: Operate a sideboom, Level 2, 8 credits.

> ID 262787: Operate a hot mix asphalt paving machine, Level 2, 8 credits.
> ID 262788: Operate a milling machine, Level 2, 8 credits.
> ID 262789: Operate a paving screed, Level 2, 6 credits.
> ID 262805: Operate a roller, Level 2, 5 credits.

***EXIT LEVEL OUTCOMES***

1. Apply health and safety legislations, regulations and procedures in plant operations.

2. Understand the nature and extent of earthworks in civil engineering construction.

3. Perform plant operation related functions.

4. Understand mechanical and leverage principles to operate earthmoving, transport and/or ancillary plant.
> Range of earthmoving plant includes, but is not limited to:
> Dragline, grader, scraper, skid steer loader, backhoe/loader, tracked dozer, continuous bucket trencher, excavator, face shovel, front end loader and wheeled dozer.
> Range transport plant includes, but is not limited to:
> Rigid body dump truck, tip truck, tractor, articulated dump truck, service truck and water cart.
> Range of ancillary plant includes, but is not limited to:
> Bitumen spray equipment, sideboom, hot mix asphalt paving machine, milling machine, paving screed and roller.

***ASSOCIATED ASSESSMENT CRITERIA***

Associated Assessment Criteria for Exit-Level-Outcome 1:

1.1 The principles and provisions of the Occupational Health and Safety Act, the National Environment Management Act and the Environment Conservation Act are explained in the context of plant operations.
1.2 Contribution to the compilation of a Health and Safety Plan for the site of plant operations is carried out in accordance with legislative requirements.
1.3 Primary emergency life support is demonstrated according to a given plant operations scenario, assistance is summoned and a report compiled according to worksite procedures.
1.4 The use of fire fighting equipment is demonstrated to contain or extinguish a fire according to worksite procedures.
1.5 Policies and procedures for dealing with HIV/Aids are identified and explained in relation to the workplace.

Associated Assessment Criteria for Exit-Level-Outcome 2:

2.1 Earthworks materials and processes used in civil engineering construction are explained in relation to plant operations.
> Range of processes include, but are not limited to: Excavation, dumping, spreading and compaction.
2.2 Civil construction activities are described in relation to their purpose, processes and sequences.
2.3 Civil construction plant and equipment are identified and explained in terms of their uses and standard industry practice.
2.4 Ways of dealing with hazards and handling hazardous materials are explained in accordance with relevant legislation and regulations.

Associated Assessment Criteria for Exit-Level-Outcome 3:

3.1 The scope, nature and composition of the construction industry is explained in terms of the roleplayers and their functions.

3.2 Specifications and drawings are interpreted and relevant information is extracted in terms of planning and establishing a work site.
3.3 Infrastructure and physical resource requirements are determined in terms of the specifications and drawings for the project.
3.4 Personal time management plan is implemented, monitored and reviewed as per project requirements and organizational procedures.
3.5 Environmental management initiatives are implemented during all phases of construction related to own areas of responsibility according to organizational procedures.
3.6 Plant operation productivity and quality are measured, monitored and improved in consultation with management according to organizational procedures.

Associated Assessment Criteria for Exit-Level-Outcome 4:

4.1 Functions of plant components, systems, instruments and controls are demonstrated according to manufacturer's specifications and instructions.
4.2 Operational fitness of all plant components are inspected and recorded according to manufacturer's operating manual and organizational procedures.
4.3 Work activities are planned and work area is prepared according to site operational requirements.
4.4 Plant is operated using principles of leverage in accordance with safe working procedures, manufacturer's specifications and earthmoving/transport activity.
4.5 Plant is loaded and secured for transportation or driven to and from work site according to safety requirements, manufacturer's instructions and transport configuration.

Integrated Assessment:

Integrated assessment at the level of the qualification provides an opportunity for learners to show that they are able to integrate concepts, principles and practice across unit standards to achieve competence that is grounded and coherent in relation to the purpose of the qualification. Integrated assessment should show how already demonstrated competence in individual areas can be linked and applied for the achievement of a holistic outcomes as described in the exit level outcomes.

Integrated assessment must judge the quality of the observable performance, and also the quality of the thinking that lies behind it. Assessment tools must encourage learners to give an account of the thinking and decision-making that underpin their demonstrated performance. Some assessment practices will demand practical evidence while others may be more theoretical, depending on the type of outcomes to be assessed. The ratio between action and knowledge is not fixed, but varies according to the demands of the particular exit level outcome of the qualification.

While the generic components of this qualification at NQF Level 2 can be assessed through occupational contexts and activities relating to Plant Operations, care must be taken in both the learning programme and the assessment to ensure that these foundational skills are portable. The primary aim of this qualification is to ensure that learners have a sound general foundation to prepare them for further learning towards a specialised role in their chosen career path. Learners must be able to transfer generic skills across a number of different contexts, and apply them within a number of learning areas.

A broad range of task-orientated and theoretical assessment tools may be used, with the distinction between practical knowledge and disciplinary knowledge maintained so that each takes its rightful place.

***INTERNATIONAL COMPARABILITY***

One of the most common forms of training for plant operators worldwide is presented by manufacturers of civil engineering plant. This form of training occurs when new plant is

purchased, the manufacturer usually assembles the equipment, sets-up and calibrates the equipment and provides limited training for the designated operator that entails a demonstration of the new plant.

For the purpose of this comparison this form of "sales related training" was considered limited to the plant and was therefore not considered. Qualifications that offered a holistic approach for entry level plant operators from the following countries were evaluated as the approach and purpose compared closely:

> Australia.
> United Kingdom.
> New Zealand.

No equivalent qualifications were found to be offered by African countries as illustrated by the following searches:

> Technical, Entrepreneurial and Vocational Education and Training Authority (TEVETA) of Malawi.
> Vocational Education and Training Authority (VETA) of Zambia.
> Botswana Training Authority (BOTA) of Botswana.

Australia:

Certificate II in Civil Construction (Plant Operations) BCC30603 is of 24 month duration. All fifteen (15) of the following core competency units and four (4) elective competency units must be achieved for this qualification:

> BCCCM1001B: Follow OH and S policies and procedures.
> BCCCM1002B: Conduct workplace communication.
> BCCCM1003B: Plan and organise work.
> BCCCM1004B: Carry out measurements and calculations.
> BCCCM1005B: Handle construction materials and safely dispose of non-toxic materials.
> BCCCM2001B: Use civil construction hand and power tools.
> BCCCM2002B: Use small plant and equipment.
> BCCCM2003B: Read and interpret plans and specifications.
> BCCCM2004B: Drain and dewater site.
> BCCCM2005B: Carry out manual excavation.
> BCCCM2007B: Spread and compact materials manually.
> BCCCM2008B: Carry out basic leveling.
> BCCCM2013B: Control traffic with a stop-slow bat.
> BCCCM2014B: Identify, locate and protect underground services.
> BCCCM2006B: Support plant operations.

Group A; Elective; Unit; Title:

> BCCPO3001B: Conduct backhoe/loader operations.
> BCCPO3002B: Conduct dozer operations.
> BCCPO3003B: Conduct excavator operations.
> BCCPO3004B: Conduct wheeled front end loader operations.
> BCCPO3005B: Conduct tracked front end loader operations.
> BCCPO3006B: Conduct grader operations.
> BCCPO3007B: Conduct scraper operations.
> BCCPO3008B: Conduct skid steer loader operations.
> BCCPO3009B: Conduct pipe layer operations.

Group B; Elective; Unit; Title:

> BCCPO3010B: Conduct integrated tool carrier operations.
> BCCPO3011B: Conduct tractor operations.
> BCCPO3012B: Conduct tip truck operations.
> BCCPO3013B: Conduct roller operations.
> BCCPO3014B: Conduct water cart operations.
> BCCPO3015B: Conduct continuous bucket trencher operations.
> BCCPO3016B: Conduct dump truck operations.
> BCCPO3017B: Conduct self propelled compactor operations.
> BCCPO3018B: Conduct paver operations.
> BCCPO3019B: Conduct stabiliser operations.

A comparison of the duration of formal study for these compared qualifications varies with the Australian certificate taking 2 years to achieve. This is because the licensing requirements are included for the achievement of the qualification, while this requirement is not part of the South African equivalent.

The above elective units (Groups A and B) compare closely with the electives of the South African qualification. While the units for "pipe layer", "tool carrier" and "stabilizer" are included here these plant do not feature in the South African qualification. The remaining plant compare directly in terms of the level, outcomes, credit value and assessment.

A comparison of the core unit standards suggest that the following South African unit standards cover similar learning areas to that of the Australian unit standards indicated above:

> Demonstrate an understanding of Occupational Health, Safety and Environmental Legislations.
> Describe the construction industry composition its work procurement systems and communication techniques.
> Establish and prepare a work area.
> Demonstrate an understanding of earthworks.
> Apply regulatory requirements in plant operations.
> Demonstrate knowledge of civil construction works.

United Kingdom:

The National Vocational Qualification in Plant Operations, Level 2 (100/5587/3) provides for plant operations that cover a vast range of plant resources and activities which include:

> Lifting plant or machines.
> Transferring plant or machines.
> Extracting plant or machines.
> Excavating plant or machines.
> Construction and formation plant or machines.
> Receiving or transporting plant or machines.
> Accessing plant or machines.
> Laying or distributing plant or machines.
> Compacting plant or machines.
> Processing plant or machines.

The following three mandatory units form the core component of this qualification:

> R/102/3275: Conform to general workplace safety.
> Y/102/3276: Conform to efficient work practices.

> M/103/3747: Prepare plant or machinery for operational performance.

The following units represent the elective component of the qualification:

> T/103/3748: Operate plant or machinery to lift and transfer loads.
> A/103/3749: Operate plant or machinery to extract.
> M/103/3750: Operate plant or machinery to excavate.
> T/103/3751: Operate plant or machinery to construct and form.
> A/103/3752: Operate plant or machinery to receive and transport loads.
> F/103/3753: Operate plant or machinery for accessing.
> J/103/3754: Operate plant or machinery to lay and distribute.
> L/103/3755: Operate plant or machinery to compact.
> R/103/3756: Operate plant or machinery to process.
> R/103/3711: Direct and guide the movement of plant or machinery.
> K/103/3715: Arrange and secure loads.
> Y/103/3757: Operate road rail plant.
> D/103/3758: Operate ancillary equipment.

Additional Units (not compulsory):

> D/102/3277: Move and handle resources.
> M/103/3716: Operate specialised powered tools and equipment.
> T/103/3717: Set out secondary dimensional work control.
> A/103/3721: Slinging and signalling the movement of loads.
> H/103/3759: Plant operations from a barge.
> Y/103/3760: Erect and dismantle plant (Cranes and Rigs).

The learning areas covered by all three core unit standards identified above are also catered for in the following South African core unit standards:

> Demonstrate an understanding of Occupational Health, Safety and Environmental Legislations.
> Apply productivity principles on a construction site.
> Apply quality principles on a construction site.
> Demonstrate a basic understanding of the mechanics of plant.

The plant catered for here has not been named in the titles of the elective units but has been clustered in terms of their functions. This approach differs from the South African qualification that clusters the plant into three categories namely, transport, earthmoving and ancillary and refers to the plant under consideration in the unit standard titles. Despite this difference in approach the qualifying learners will be able to operate the same type of plant except for cranes.

New Zealand:

The National Certificate in Civil Plant Operation (Bulk Earthmoving), Level 3, 80 Credits has been designed for entry level plant operators. This qualification will be awarded to people who have met the requirements of the compulsory and elective sections.

All the standards listed below are required:

> Inspect civil construction plant and equipment (6436), Level 4, 5 credits.
> Demonstrate knowledge of soil properties for earthworks (20477), Level 2, 3 credits.
> Demonstrate knowledge of earthworks i.r.o. the environment (20616), Level 2, 4 credits.
> Demonstrate knowledge of bulk earthmoving (20624), Level 2, 2 credits.
> Apply safe work practices in the workplace (17593), Level 2, 4 credits.

A minimum of 62 credits, including a minimum of 3 standards is required from Elective Set A or a combination of Elective Set B.

Elective Set A:

> Operate a wheeled loader on civil construction sites (17309), Level 3, 20 credits.
> Operate a hydraulic excavator on civil construction sites (17310), Level 3, 25 credits.
> Operate a motor grader for earthworks (17311), Level 3, 30 credits.
> Operate a motor scraper on civil construction sites (17314), Level 3, 20 credits.
> Operate a self-propelled roller on civil construction sites (17315), Level 3, 20 credits.
> Operate a bulldozer on civil construction sites, (17316), Level 3, 20 credits.
> Operate an articulated dump truck on civil construction sites (17317), Level 3, 20 credits.
> Operate a rigid dump truck for bulk earthmoving (20625), Level 3, 12 credits.
> Operate a hydraulic face shovel (20626), Level 3, 15 credits.
> Operate a water cart for earthworks (20628), Level 3, 12 credits.

Elective Set B:

> Describe the prevention of immobilisation and the recovery of immobilised machines (20627), Level 2, 2 credits.
> Manage first aid in emergency situations (6400), Level 3, 2 credits.
> Provide first aid (6401), Level 2, 1 credit.
> Provide resuscitation level 2 (6402), Level 1, 1 credit.
> Demonstrate knowledge and skills for driving on a road for endorsement W (wheels) (16701), Level 3, 3 credits.
> Demonstrate knowledge and skills for driving on a road for endorsement R (rollers) (16702), Level 3, 3 credits.
> Demonstrate knowledge and skills for driving on a road for endorsement T (tracks) (16703), Level 3, 3 credits.

The learning areas covered by four of the five core unit standards identified above are also catered for in the following South African core unit standards:

> Demonstrate a basic understanding of earthworks.
> Demonstrate an understanding and implement environmental initiatives on a construction activity.
> Demonstrate an understanding of Occupational Health, Safety and Environmental Legislations.
> Demonstrate knowledge of civil construction works.

The learning area covered by the remaining core unit on "inspecting plant" is catered for in all the elective unit standards in relation to each type of plant rather than a separate unit standard for this competency.

The South African qualification offers a wider range of plant (23) in the elective component compared to this New Zealand qualification (10). The three "first aid" units of elective set B share common learning areas with the following core unit standards of the National Certificate in Plant Operations, Level 2:

> Perform basic fire fighting.
> Provide risk-based primary emergency care/first aid in the workplace.

Conclusion:

All the compared qualifications serve the same purpose of preparing qualifying learners to acquire entry level knowledge and skills to be able to operate selected plant in various contexts. The core unit standards of these qualifications reflect similarities pertaining to "safety", "first-aid", "earthworks and civil construction works" and "environmental issues". The scope of the core component of the South African qualification exceeds its counterparts as it prepares the learner for the workplace beyond the operation of plant to include other important competencies to ensure success.

The approach to the clustering of the elective units for each type of plant differ, however, all the common plant used is catered for in these qualifications. The Australian qualification reflects the closest similarity as it provides for operating nineteen of the twenty three plant catered for in the South African equivalent.

***ARTICULATION OPTIONS***

The possibility exists for vertical articulation with this Qualification. The following qualifications serve as examples of vertical articulation:

> ID 49081: National Certificate: Construction: Advanced Plant Operations, NQF Level 3.
> ID 49080: National Certificate: Construction: Advanced Crane Operations, NQF Level 3.
> National Certificate: Lifting Machine Operation, NQF Level 3.

Examples of horizontal articulation with this Qualification are:

> ID 48961: National Certificate: Construction: Crane Operations, NQF Level 2.
> ID 58433: National Certificate: Fishing Operations, NQF Level 2.

***MODERATION OPTIONS***

> Anyone assessing a learner or moderating the assessment of a learner against the qualification must be registered as an assessor with the relevant Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding 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 Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding with the relevant ETQA.

> Assessment and moderation of assessment will be overseen by the relevant Education, Training, Quality, Assurance (ETQA) Body, or by an ETQA that has a Memorandum of Understanding with the relevant ETQA, according to the ETQA's policies and guidelines for assessment and moderation.

> Moderation must include both internal and external moderation of assessments, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described in the associated unit standards.

> 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***

> Any institution offering learning that will enable achievement of this qualification and the associated unit standards must be accredited by the relevant ETQA.
> External Moderation of assessment will be overseen by the relevant ETQA at its discretion.
> The accredited Training Provider will oversee internal moderation of assessment.
> Internal and external moderation should encompass achievement of competence described in the exit level outcomes of the qualification as well as the integrated competence described in the purpose of the qualification.

***NOTES***

This qualification replaces qualification 48940, "National Certificate: Construction Plant Operations", Level 2, 133 credits.

***UNIT STANDARDS***

| | ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|---|---|---|---|---|
| Fundamental | 119463 | Access and use information from texts | Level 2 | 5 |
| Fundamental | 9009 | Apply basic knowledge of statistics and probability to influence the use of data and procedures in order to investigate life related problems | Level 2 | 3 |
| Fundamental | 7480 | Demonstrate understanding of rational and irrational numbers and number systems | Level 2 | 3 |
| Fundamental | 9008 | Identify, describe, compare, classify, explore shape and motion in 2-and 3-dimensional shapes in different contexts | Level 2 | 3 |
| Fundamental | 119454 | Maintain and adapt oral/signed communication | Level 2 | 5 |
| Fundamental | 119460 | Use language and communication in occupational learning programmes | Level 2 | 5 |
| Fundamental | 7469 | Use mathematics to investigate and monitor the financial aspects of personal and community life | Level 2 | 2 |
| Fundamental | 9007 | Work with a range of patterns and functions and solve problems | Level 2 | 5 |
| Fundamental | 119456 | Write/present for a defined context | Level 2 | 5 |
| Core | 252259 | Plan, organise and manage own activities in the organisation | Level 1 | 2 |
| Core | 14556 | Apply productivity principles on a construction site | Level 2 | 6 |
| Core | 9986 | Apply quality principles on a construction site | Level 2 | 12 |
| Core | 262687 | Apply regulatory requirements in plant operations | Level 2 | 3 |
| Core | 262726 | Demonstrate a basic understanding of the mechanics of plant | Level 2 | 4 |
| Core | 114219 | Demonstrate an understanding and implement environmental initiatives on a construction activity | Level 2 | 4 |
| Core | 262685 | Demonstrate an understanding of earthworks | Level 2 | 3 |
| Core | 262724 | Demonstrate knowledge of civil construction works | Level 2 | 3 |
| Core | 9978 | Describe the construction industry composition its work procurement systems and communication techniques | Level 2 | 3 |
| Core | 9966 | Establish and prepare a work area | Level 2 | 4 |
| Core | 12484 | Perform basic fire fighting | Level 2 | 4 |
| Core | 120496 | Provide risk-based primary emergency care/first aid in the workplace | Level 2 | 5 |
| Core | 12463 | Understand and deal with HIV/AIDS | Level 2 | 3 |
| Core | 14633 | Adhere to disciplinary code | Level 3 | 1 |
| Core | 246667 | Demonstrate an understanding of Occupational Health, Safety and Environmental Legislations | Level 3 | 4 |
| Core | 123258 | Foster and maintain customer relations | Level 3 | 10 |
| Elective | 262824 | Operate a Sideboom | Level 2 | 8 |
| Elective | 262727 | Operate a backhoe/loader | Level 2 | 15 |
| Elective | 262732 | Operate a continuous bucket trencher | Level 2 | 15 |
| Elective | 262730 | Operate a dragline | Level 2 | 20 |
| Elective | 262746 | Operate a face shovel | Level 2 | 15 |
| Elective | 262747 | Operate a front end loader | Level 2 | 12 |
| Elective | 262735 | Operate a grader | Level 2 | 15 |
| Elective | 262787 | Operate a hot mix asphalt paving machine | Level 2 | 8 |
| Elective | 262788 | Operate a milling machine | Level 2 | 8 |
| Elective | 262789 | Operate a paving screed | Level 2 | 6 |
| Elective | 262731 | Operate a rigid body dump truck | Level 2 | 10 |
| Elective | 262805 | Operate a roller | Level 2 | 5 |
| Elective | 262710 | Operate a scraper | Level 2 | 12 |
| Elective | 262790 | Operate a service truck | Level 2 | 8 |
| Elective | 262712 | Operate a skid steer loader | Level 2 | 8 |
| Elective | 262734 | Operate a tip truck | Level 2 | 8 |
| Elective | 262729 | Operate a tracked dozer | Level 2 | 15 |
| Elective | 262804 | Operate a tractor | Level 2 | 8 |
| Elective | 262764 | Operate a water cart | Level 2 | 8 |

| | ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|---|---|---|---|---|
| Elective | 262713 | Operate a wheeled dozer | Level 2 | 12 |
| Elective | 262745 | Operate an articulated dump truck | Level 2 | 10 |
| Elective | 262744 | Operate an excavator | Level 2 | 15 |
| Elective | 262785 | Operate bitumen spray equipment | Level 2 | 5 |
| Elective | 262728 | Grade to final levels using a motor grader | Level 3 | 16 |

***LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION***
***None***

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Demonstrate an understanding of earthworks***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262685 | Demonstrate an understanding of earthworks | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 3 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116051 | Demonstrate fundamental knowledge of earthworks | Level 2 | 5 | Will occur as soon as 262685 is registered |

**SPECIFIC OUTCOME 1**
Describe different soil types.

**SPECIFIC OUTCOME 2**
Demonstrate knowledge of bulk excavation.

**SPECIFIC OUTCOME 3**
Describe dumping and spreading operations.

**SPECIFIC OUTCOME 4**
Describe erosion control at an earthworks site.

**SPECIFIC OUTCOME 5**
Describe compaction of earthworks materials.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Apply regulatory requirements in plant operations***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262687 | Apply regulatory requirements in plant operations | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 3 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116154 | Demonstrate knowledge of and apply regulatory requirements pertaining to plant operation | Level 2 | 5 | Will occur as soon as 262687 is registered |

**SPECIFIC OUTCOME** 1
Apply relevant Occupational Health and Safety legislation.

**SPECIFIC OUTCOME** 2
Identify local hazards on an earthworks site.

**SPECIFIC OUTCOME** 3
Explain control measures for hazardous materials.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a scraper***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262710 | Operate a scraper | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 12 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116071 | Operate a scraper | Level 2 | 20 | Will occur as soon as 262710 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a scraper.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down scraper.

**SPECIFIC OUTCOME** 4
Operate scraper.

**SPECIFIC OUTCOME** 5
Transport scraper to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Operate a skid steer loader***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262712 | Operate a skid steer loader | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116210 | Operate a Skid Steer Loader | Level 2 | 16 | Will occur as soon as 262712 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a skid steer loader.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down skid steer loader.

**SPECIFIC OUTCOME** 4
Operate skid steer loader.

**SPECIFIC OUTCOME** 5
Transport skid steer loader to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a wheeled dozer***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262713 | Operate a wheeled dozer | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 12 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116045 | Operate wheeled dozer | Level 2 | 20 | Will occur as soon as 262713 is registered |

SPECIFIC OUTCOME 1
Demonstrate knowledge of the functions of a wheeled dozer.

SPECIFIC OUTCOME 2
Plan for work activities and prepare work area.

SPECIFIC OUTCOME 3
Start and shut down wheeled dozer.

SPECIFIC OUTCOME 4
Operate wheeled dozer.

SPECIFIC OUTCOME 5
Transport wheeled dozer to and from site.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Demonstrate knowledge of civil construction works***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262724 | Demonstrate knowledge of civil construction works | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 3 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116162 | Demonstrate knowledge of civil construction works | Level 2 | 5 | Will occur as soon as 262724 is registered |

SPECIFIC OUTCOME 1
Explain civil construction processes and sequences.

SPECIFIC OUTCOME 2
Demonstrate knowledge of civil construction plant and equipment.

SPECIFIC OUTCOME 3
Describe effects of adverse weather on construction environments and activities.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Demonstrate a basic understanding of the mechanics of plant***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262726 | Demonstrate a basic understanding of the mechanics of plant | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 4 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116152 | Demonstrate mechanical awareness and plant appreciation | Level 2 | 5 | Will occur as soon as 262726 is registered |

**SPECIFIC OUTCOME** 1
Identify and describe functions of major components and systems.

**SPECIFIC OUTCOME** 2
Identify and describe functions of instruments and controls.

**SPECIFIC OUTCOME** 3
Inspect and record operational fitness of all plant components.

**SPECIFIC OUTCOME** 4
Apply principles of leverage.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**
**None**

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a backhoe/loader***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262727 | Operate a backhoe/loader | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 15 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116333 | Operate backhoe/loader | Level 2 | 20 | Will occur as soon as 262727 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a backhoe/loader.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down backhoe/loader.

**SPECIFIC OUTCOME** 4
Operate backhoe/loader.

**SPECIFIC OUTCOME** 5
Transport backhoe/loader to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Grade to final levels using a motor grader***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262728 | Grade to final levels using a motor grader | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 3 | 16 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116992 | Conduct advanced grader operations | Level 3 | 26 | Will occur as soon as 262728 is registered |

**SPECIFIC OUTCOME** 1
Apply concepts for grading final levels.

**SPECIFIC OUTCOME** 2
Co-ordinate final level operations.

**SPECIFIC OUTCOME** 3
Lead a final level operations team.

**SPECIFIC OUTCOME** 4
Grade to final levels using a grader.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a tracked dozer***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262729 | Operate a tracked dozer | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 15 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116058 | Operate a tracked dozer | Level 2 | 24 | Will occur as soon as 262729 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a tracked dozer.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down tracked dozer.

**SPECIFIC OUTCOME** 4
Operate tracked dozer.

**SPECIFIC OUTCOME** 5
Transport tracked dozer to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a dragline***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262730 | Operate a dragline | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 20 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116130 | Operate a dragline | Level 2 | 24 | Will occur as soon as 262730 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a dragline.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down dragline.

**SPECIFIC OUTCOME** 4
Operate dragline.

**SPECIFIC OUTCOME** 5
Transport dragline to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a rigid body dump truck***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262731 | Operate a rigid body dump truck | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 10 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116097 | Operate a rigid body dump truck | Level 2 | 16 | Will occur as soon as 262731 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a rigid body dump truck.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down rigid body dump truck.

**SPECIFIC OUTCOME** 4
Operate rigid body dump truck.

**SPECIFIC OUTCOME** 5
Transport rigid body dump truck to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Operate a continuous bucket trencher***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262732 | Operate a continuous bucket trencher | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 15 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116132 | Operate continuous bucket trencher | Level 2 | 8 | Will occur as soon as 262732 is registered |

SPECIFIC OUTCOME 1
Demonstrate knowledge of the functions of a continuous bucket trencher.

SPECIFIC OUTCOME 2
Plan for work activities and prepare work area.

SPECIFIC OUTCOME 3
Start and shut down continuous bucket trencher.

SPECIFIC OUTCOME 4
Operate continuous bucket trencher.

SPECIFIC OUTCOME 5
Transport continuous bucket trencher to and from site.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Operate a tip truck***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262734 | Operate a tip truck | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116067 | Operate a tip truck | Level 2 | 6 | Will occur as soon as 262734 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a tip truck.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down tip truck.

**SPECIFIC OUTCOME** 4
Operate tip truck.

**SPECIFIC OUTCOME** 5
Transport tip truck to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a grader***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262735 | Operate a grader | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 15 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116078 | Operate a grader | Level 2 | 26 | Will occur as soon as 262735 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a grader.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down grader.

**SPECIFIC OUTCOME** 4
Operate grader.

**SPECIFIC OUTCOME** 5
Transport grader to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate an excavator***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262744 | Operate an excavator | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 15 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116047 | Operate excavator | Level 2 | 20 | Will occur as soon as 262744 is registered |

SPECIFIC OUTCOME 1
Demonstrate knowledge of the functions of an excavator.

SPECIFIC OUTCOME 2
Plan for work activities and prepare work area.

SPECIFIC OUTCOME 3
Start and shut down excavator.

SPECIFIC OUTCOME 4
Operate excavator.

SPECIFIC OUTCOME 5
Transport excavator to and from site.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate an articulated dump truck***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262745 | Operate an articulated dump truck | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 10 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116330 | Operate articulated dump truck | Level 2 | 16 | Will occur as soon as 262745 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of an articulated dump truck.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down articulated dump truck.

**SPECIFIC OUTCOME** 4
Operate articulated dump truck.

**SPECIFIC OUTCOME** 5
Transport articulated dump truck to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a face shovel***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262746 | Operate a face shovel | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 15 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116054 | Operate face shovel | Level 2 | 24 | Will occur as soon as 262746 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a face shovel.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down face shovel.

**SPECIFIC OUTCOME** 4
Operate face shovel.

**SPECIFIC OUTCOME** 5
Transport face shovel to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a front end loader***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262747 | Operate a front end loader | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 12 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116102 | Operate front end loader | Level 2 | 16 | Will occur as soon as 262747 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a front end loader.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down front end loader.

**SPECIFIC OUTCOME** 4
Operate front end loader.

**SPECIFIC OUTCOME** 5
Transport front end loader to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Operate a water cart***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262764 | Operate a water cart | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116073 | Operate water cart | Level 2 | 6 | Will occur as soon as 262764 is registered |

SPECIFIC OUTCOME 1
Demonstrate knowledge of the functions of a water cart.

SPECIFIC OUTCOME 2
Plan for work activities and prepare work area.

SPECIFIC OUTCOME 3
Start and shut down water cart.

SPECIFIC OUTCOME 4
Operate water cart.

SPECIFIC OUTCOME 5
Transport water cart to and from site.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate bitumen spray equipment***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262785 | Operate bitumen spray equipment | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 5 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116135 | Operate bitumen spray bitumen spray equipment | Level 2 | 5 | Will occur as soon as 262785 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of bitumen spray equipment.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down bitumen spray equipment.

**SPECIFIC OUTCOME** 4
Operate bitumen spray equipment.

**SPECIFIC OUTCOME** 5
Transport bitumen spray equipment to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Operate a hot mix asphalt paving machine***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262787 | Operate a hot mix asphalt paving machine | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116146 | Operate a hot mix asphalt paving machine | Level 2 | 8 | Will occur as soon as 262787 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a hot mix asphalt paving machine.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down hot mix asphalt paving machine.

**SPECIFIC OUTCOME** 4
Operate hot mix asphalt paving machine.

**SPECIFIC OUTCOME** 5
Transport hot mix asphalt paving machine to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a milling machine***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262788 | Operate a milling machine | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116142 | Operate a milling machine | Level 2 | 8 | Will occur as soon as 262788 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a milling machine.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down milling machine.

**SPECIFIC OUTCOME** 4
Operate milling machine.

**SPECIFIC OUTCOME** 5
Transport milling machine to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a paving screed***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262789 | Operate a paving screed | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 6 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116140 | Operate a paving screed | Level 2 | 6 | Will occur as soon as 262789 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a paving screed.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down paving screed.

**SPECIFIC OUTCOME** 4
Operate paving screed.

**SPECIFIC OUTCOME** 5
Transport paving screed to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a service truck***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262790 | Operate a service truck | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116085 | Operate service truck | Level 2 | 10 | Will occur as soon as 262790 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a service truck.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down service truck.

**SPECIFIC OUTCOME** 4
Operate service truck.

**SPECIFIC OUTCOME** 5
Transport service truck to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Operate a tractor***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262804 | Operate a tractor | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116177 | Operate a tractor | Level 2 | 6 | Will occur as soon as 262804 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a tractor.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down tractor.

**SPECIFIC OUTCOME** 4
Operate tractor.

**SPECIFIC OUTCOME** 5
Transport tractor to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a roller***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262805 | Operate a roller | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 5 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116089 | Operate a roller | Level 2 | 8 | Will occur as soon as 262805 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a roller.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down roller.

**SPECIFIC OUTCOME** 4
Operate roller.

**SPECIFIC OUTCOME** 5
Transport roller to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 65789 | National Certificate: Construction Plant Operations | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Operate a Sideboom***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262824 | Operate a Sideboom | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 116075 | Operate a sideboom | Level 2 | 8 | Will occur as soon as 262824 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate knowledge of the functions of a Sideboom.

**SPECIFIC OUTCOME** 2
Plan for work activities and prepare work area.

**SPECIFIC OUTCOME** 3
Start and shut down Sideboom.

**SPECIFIC OUTCOME** 4
Operate sideboom.

**SPECIFIC OUTCOME** 5
Transport Sideboom to and from site.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**
**None**

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***QUALIFICATION:***
***National Certificate: Hot Water System Installation***

| *SAQA QUAL ID* | *QUALIFICATION TITLE* | | |
|---|---|---|---|
| 65858 | National Certificate: Hot Water System Installation | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *QUALIFICATION TYPE* | *FIELD* | *SUBFIELD* | |
| National Certificate | 12 - Physical Planning and Construction | Civil Engineering Construction | |
| *ABET BAND* | *MINIMUM CREDITS* | *NQF LEVEL* | *QUAL CLASS* |
| Undefined | 122 | Level 2 | Regular-Unit Stds Based |

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

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

This Qualification is for any individual who is, or wishes to be, involved as a hot water system installer in the plumbing sector. The individual will perform this activity under the supervision and guidance of a qualified plumber. The Qualification contains all the competencies, skills and values required by a learner who may wish to work towards becoming a fully qualified plumber by completing the plumbing qualification is at NQF Level 4. This Qualification could be deemed to be an entry level qualification into the plumbing field.

The core component of the National Certificate: Hot Water System Installation at NQF Level 2 contains a range of competencies that help the learner install a hot water system and perform many of the activities performed by a plumber, albeit at a lower level. The core component consists of competencies in:

> Mounting and connecting a solar heating/hot water system.
> Installing and testing cold and hot water supply system.
> Applying basic plumbing principles.
> Applying basic first aid.
> Applying health and safety rules and regulations.
> Using scaffolding and harnesses.
> Reading and interpreting construction drawings and specifications.
> Using and maintaining hand and power tools and equipment.

The Elective component allows for the acquisition of entrepreneurial competencies or deepening of understanding of aspects in trades within the construction environment.

Learners working towards this Qualification will find that the acquisition of competencies in the Unit Standards, which make up the Qualification, will add value to their conceptual understanding of the field and their work performance. This Qualification is intended to enhance the provision of service - specifically the installation of hot water systems - within the plumbing sector.

The Qualification will facilitate access to, and mobility and progression within, education and training for learners who:

> Were previously disadvantaged.
> Have worked in this field for many years, but have no formal Qualification and would like to achieve this Qualification through the process of Recognition of Prior Learning (RPL) and/or formal study.
> Wish to extend their range of skills and knowledge and hence their competencies in quality management systems environment.

The intention of this Qualification is to:

> Promote the development of knowledge, skills and values that are required for service excellence within the plumbing field.
> Release the potential of people.
> Provide opportunities for people to explore different activities within the plumbing sector.

Rationale:

There is an immense demand for hot water system installers throughout the country. This demand has been fuelled by two factors. Firstly, as the state extends electricity supply to areas which had no power before; more homes are beginning to install hot water systems to make their lives easier. Secondly, and more critically, Eskom, South Africa's giant power utility, has been unable to keep pace with the power demands of the economy due to a variety of reasons. The year 2008 was witness to the phenomenon of load-shedding that created chaos and the cost to the economy has been incalculable.

A possible immediate solution is to encourage households to install solar heating systems that will dramatically reduce the demand on the country's power supply. This entails the training of hot water system installers as a matter of urgency. While Eskom's drive is towards the installation of solar heating appliances, the installation of hot water systems generally will continue at a pace. Hence, the need for this Qualification.

It is accepted that a plumber who has acquired the plumbing qualification entitled FETC: Plumbing and completed the Unit Standard entitled "Install and maintain solar water heating systems" (ID 244499) will be able to plan, install, test and maintain a hot water system, both electrical and solar. This NQF Level 2 Qualification, however, is directed to an individual who will focus solely on the installation of the hot water system under the supervision of a qualified plumber and does not include on site assessment, planning and maintenance of the system.

It will be in the interest of the country as a whole to ultimately have qualified hot water system installers who are trained according to this Qualification in order to improve productivity, efficiency and effectiveness.

Currently there are no national Qualifications for these learners at this level. Learners tend to enter the field by acquiring work experience with a plumbing company. The plumbing qualification at NQF Level 4 is not easily accessible by many learners who have not had the opportunity of obtaining a relevant Level 3 qualification in order to access it.

The National Certificate: Hot Water System Installation at NQF Level 2 is the first national Qualification in this sector. The National Certificate: Hot Water System Installation at NQF Level 2 supports the objectives of the NQF in that it gives the learner access to a registered Qualification. It will ensure that the quality of education and training in the plumbing is enhanced and of a world-class standard. The Qualification will allow learners not only to develop their knowledge and skills in the plumbing field but will also enable them to benchmark their competence against international standards.

***RECOGNIZE PREVIOUS LEARNING?***
Y

***LEARNING ASSUMED IN PLACE***
Learners wishing to study towards this Qualification are assumed to have:

> Mathematical literacy at NQF Level 1.
> Communication at to NQF Level 1.

Recognition of Prior Learning:

The structure of this Unit Standard-based Qualification makes the recognition of prior learning (RPL) possible, if the learner is able to demonstrate competence in the knowledge, skills, values and attitudes implicit in this Qualification.

Learners who already work in the plumbing sector and who believe that they possess the competencies to enable them to meet all of the outcomes listed in the Unit Standards will be able to present themselves for assessment against the Unit Standards of their choice. A range of assessment tools and techniques should be used which have been jointly decided upon by the learner and the assessor. Such procedures, and the assessment of individual cases, are subject to moderation by independent assessors. The same principles that apply to assessment of this Qualification also apply to recognition of prior learning.

Once found competent, these learners will be certified as competent and credited accordingly. Recognition of Prior Learning can also be conducted for these learners at Qualification level, by means of Integrated Assessment.

RPL will allow for accelerated access to further learning and gaining of credits towards the Qualification. All RPL ought to be carried out by the provider in agreement with the relevant ETQA or another ETQA that has a Memorandum of Understanding in place with the relevant ETQA.

RPL is particularly important, as there are people in the profession with a variety of Qualifications of differing quality and scope. It is important that an RPL process be available to assist in making sense of existing Qualifications, and helping to standardise Qualifications towards a common standard.

***QUALIFICATION RULES***
A minimum of 122 credits are required to complete the Qualification which is made up of the following components:

> Fundamental: 36 credits.
> Core: 69 credits.
> Electives: 17 credits.
> Total: 122 credits.

Motivation for the number of credits assigned to the Fundamental, Core and Elective Components:

Fundamental Component:

There are 36 credits allocated to this component at the level of the Qualification. These constitute Communication and Mathematical Literacy skills. All the Unit Standards designated as Fundamental are compulsory.

Core Component:

69 credits have been allocated to Unit Standards designated as Core for the purpose of this Qualification. These Unit Standards provide the generic knowledge and skills related to Quality Management in general, issues that have been highlighted in the Purpose Statement.

All the Unit Standards indicated as Core are compulsory.

Elective Component:

Electives that add up to a minimum of 17 credits.

These Elective Unit Standards provide opportunities for the holistic development of the learner and allow for maximum flexibility and multi-skilling to enable the learners to achieve a Qualification that is relevant to the context in which they work.

***EXIT LEVEL OUTCOMES***

1. Explain and apply knowledge of health and safety as it pertains to installation of a hot water system.

2. Apply knowledge of scaffolding and fall arrest for the installation of a hot water system.

3. Explain basic plumbing principles and construction drawings to enable installation of hot water system.

4. Install a solar water heating/hot water system.

Critical Cross-Field Outcomes:

Identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made when:

> Interpreting roof layout drawings and building drawings.
> Selecting and using appropriate tools and equipment.
> Identifying and pro-actively correcting issues of non-availability of resources and materials.
> Identifying potential hazards and dealing with them.
> Following procedures for the identification of emergencies.
> Identifying and solving problems during the application and maintaining of safety in an electrical environment.
> Erecting and dismantling a system scaffold with ladder access taking into consideration physical conditions.
> Solving problems related to the installation, use and performance of basic rescues for fall arrest systems.

Work effectively with others as a member of a team, group, organisation, community to:

> Install the solar water heating/hot water system.
> Ensure the safety of all personnel during installation and follow procedures that apply to illness or injury in the work area.
> Ensure that plumbing principles are correctly applied in the performance of plumbing task.
> Work in unison with co-workers and other trades on site.
> Communicate and receive advice from client.
> Follow procedures for reporting and recording to the relevant authority.
> Erect and dismantle a system scaffold with ladder access.
> Implement fall protection plans.

Organise and manage oneself and one's activities responsively and effectively when:

> Reading and interpreting roof layout and building drawings.
> Identifying, selecting, maintaining and storing appropriate tools and equipment.
> Installing the solar water heating/ hot water system.
> Ensuring the safety of all personnel during installation of both the water supply system and the hot water system in accordance with building industry regulations.
> Determining pipe sizes in preparation for the installation of water supply systems.
> Follow procedures that apply to illness or injury in the work area.
> Follow procedures for reporting and recording are demonstrated.
> Reporting of unsafe conditions.
> Installing and using fall arrest systems.

Collect, analyse, organise and critically evaluate information to:

> Prepare for and install hot water system.
> Interpret information contained in drawings.
> Set out work areas from provided control positions and levels in accordance with instructions and drawings.
> Use reporting and recording procedures.

Communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation to:

> use the equipment according to manufacturer's instructions.
> Issue clear verbal instructions to team members.
> Listen to feedback received from team members.
> Report problem situations to the client.
> Limit damage to persons or property in the case of an emergency.
> Report injuries involving individuals promptly to the relevant persons.
> Inspect and assemble fall arrest equipment and systems.

Use science and technology effectively and critically, showing responsibility towards the environment and the health of others by:

> Using the appropriate tools and equipment according to manufacturer's instructions.

***ASSOCIATED ASSESSMENT CRITERIA***
Associated Assessment Criteria for Exit Level Outcome 1:

> Basic first aid techniques are applied to alleviate pain and assistance is requested to treat serious cases.
> Potential hazards in the work area are identified and attended to.
> Damage to persons or property in the case of an emergency is limited through identification of the type of emergencies and responding appropriately.
> Procedures that apply to illness or injury in the work area are applied and a report is prepared to the relevant authority.
> Safety signs, regulations and procedures related to a working environment are adhered to prevent injury.
> Appropriate safety procedures are followed before, during and after job processes.
> Safety anomalies are reported and recorded in accordance with worksite procedures.

Associated Assessment Criteria for Exit Level Outcome 2:

> A system scaffold with ladder access is erected and dismantled according to standard procedure.
> A trestle scaffold is erected and dismantled according to procedure and specifications.
> An extension ladder is erected and dismantled and a step ladder is used according to procedure.
> Basic knowledge of the limitations of a limited range of fall arrest equipment and regulations is demonstrated.
> Fall arrest equipment is inspected, assembled and stored.
> Fall arrest equipment is used according to procedure.
> Pre-installed vertical and horizontal life-lines are used and explained to reduce risks during rescue.

Associated Assessment Criteria for Exit Level Outcome 3:

> Pressure and flow principles are applied to ensure that plumbing work performed is in accordance with building regulations requirements.
> Basic pipe sizing is applied to plumbing applications/operations to ensure correct fitting.
> System components and materials are described so that they are used according to manufacturer's instructions.
> The role of drawings is explained in relation to project specifications, contract documentation, quantities and construction.
> Drawings are identified in terms of type and application for a construction process.
> Symbols and abbreviations are interpreted in terms of their functions and meanings.

Associated Assessment Criteria for Exit Level Outcome 4:

> Install and test cold and hot water supply systems according to purpose and instructions.
> The theory regarding solar water heating/hot water systems is explained in terms of the advantages/disadvantages, dangers and in terms of the aspects/dynamics pertaining to the various solar water heating combinations.
> Knowledge of roof trusses is explained and applied in order to complete installation of hot water system.
> Solar water heating/hot water system is installed according to manufacturer's specifications and the appropriate South African National Standards (SANS).
> National Building Regulations and safety legislation are explained and adhered to in order to ensure compliance and safety during the installation.
> All safety measures including the use of protective clothing and the safe handling ot tools are applied in accordance with installation requirements.

Integrated Assessment:

The importance of integrated assessment is to confirm that the learner is able to demonstrate applied competence (practical, foundational and reflexive) and ensure that the purpose of this Qualification is achieved. Both formative and summative assessment methods and strategies are used to ensure that the Exit Level Outcomes and the purpose of the Qualification are achieved through the achievement of the Unit Standards. Learning, teaching and assessment are inextricably linked.

Learning and assessment should be integrated and assessment practices must be fair, transparent, valid and reliable. A variety of assessment strategies and approaches must be used. This could include tests, assignments, projects, demonstrations and/or any applicable method. The learner must demonstrate evidence of analytical thinking, problem solving, and integration of theory and practice as deemed appropriate at this level.

Formative assessment is an on-going process which is used to assess the efficacy of the teaching and learning process. It is used to plan appropriate learning experiences to meet the

learner's needs. Formative assessments can include a mix of simulated and actual (real) clinical practice or authentic settings. Feedback from assessment informs both teaching and learning. If the learner has met the assessment criteria of the Unit Standards then s/he has achieved the Exit Level Outcomes of the Qualification.

Summative assessment is concerned with the judgement of the learning in relation to the Unit Standards and consequently of the Exit Level Outcomes of the Qualification. Such judgement must include integrated assessment(s) which test the learners' ability to integrate the larger body of knowledge, skills and attitudes, which are represented by the Unit Standards and the Exit Level Outcomes. Summative assessment can take the form of oral, written and practical examinations as agreed to by the relevant ETQA.

Integrated assessment must be designed to achieve the following:

> An integration of the achievement of the Exit Level Outcomes in a way that reflects a comprehensive approach to learning and shows that the purpose of the Qualification has been achieved.

> Judgement of learner performance to provide evidence of applied competence or capability.

***INTERNATIONAL COMPARABILITY***
The main competencies of this Qualification are as follows:

> Apply plumbing principles as they pertain to the installation of a hot water system.
> Install and test cold and hot water supply systems.
> Mount and connecting solar water heating systems.

The following countries were considered:

> The United States - a leader in solar heating systems.
> Canada - also a leader in solar heating systems.
> United Kingdom - a leader in solar heating systems.
> Denmark - even more advanced than United Kingdom in this aspect.
> Lithuania.
> Qatar, Saudi Arabia, Oman, Israel and Kuwait were also investigated because these are very hot countries and the use of solar energy would significantly reduce dependence on electricity and other sources of energy.
> India - is a rising technological giant.
> Taiwan - is a significant producer of solar heating products but information on training and qualifications is not available.
> China - this country is a huge market for solar heating systems.
> Algeria, Egypt, Tunisia and Morocco.
> Uganda.
> Ghana.
> Nigeria.
> Botswana and Zimbabwe.

United States:

The North American Board of Certified Energy Practitioners (NABCEP) conducts the NABCEP Solar Thermal Installer Certification examination, which is obtained in several ways. training in Requirements/Education. Eight minimum entry requirement tracks are accepted, which are primarily based on experience which includes the installation of Solar Thermal Systems. NABCEP has identified a detailed Task Analysis for Solar Water and Pool Heating Systems Installation. It is important to note that these tasks are applicable to the installation contractor - not to the system designer. This task list assumes the installation contractor starts with an

approved solar system design package, complete with major components, manufacturer installation manual, system schematics, and assembly and troubleshooting instructions.

Fundamentally, these tasks assume that the installer begins with adequate documentation for the system design and equipment, including manuals for major components, electrical and mechanical drawings, and instructions. Each student will be expected to have basic plumbing, electrical, and roofing skills. (Specifically, knowledge of basic plumbing tasks such as soldering pipe joints, gluing pipe joints, sealing fittings, testing for plumbing leaks, etc. In regards to electrical, the installer should be familiar with basic electrical concepts and terms and with the operation of a multimeter. Also included is the ability to connect wiring, create weather sealed connections, etc. Regarding roofing knowledge, the installer should be familiar with basic roof materials, terminologies as well as flashing and sealing methods. The tasks are detailed under the following heading:

> Working safely with solar hot water and pool heating systems.
> Identifying systems and their components.
> Adapting a system design.
> Conducting a site assessment.
> Installing solar collectors.
> Installing water heater and storage tanks.
> Installing piping, pipe insulation and connecting system piping.
> Installing mechanical/plumbing equipment and other components.
> Installing electrical control systems.
> Installing operation and identification tags and labels.
> Performing a system checkout.
> Maintaining and troubleshooting a solar thermal system.

NABCEP also provides training and education options for certification purposes.

The Midwest Renewable Energy Association (MREA) is a national leader in providing high quality education and training programs for consumers, businesses, and renewable energy system installers. They offer workshops and courses recognised by the Wisconsin Department of Commerce as continuing education for licensed professionals. The following two courses have relevance:

Courses:

> Solar Domestic Hot Water Installation:
> 14 hours of credit.
> Solar Domestic Hot Water Systems:
> 7 hours of credit.

Learn how to use the sun's energy for domestic uses: Showers, sinks, clothes washer. These systems are easy to install and often pay for themselves in energy savings in just a few years. This class provides an overview of a variety of system types. This class will include an examination of an on-site solar hot water heating system.

The College of Extended and International Education of the University of California (Dominguez Hills) offers the following course entitled: Fundamentals of Solar Hot Water Heating.

This online course concentrates on the basics of installing code compliant solar hot water systems. This course will be useful for people who currently work in or plan to be employed in the solar hot water industry. Student technicians will learn practical design criteria, installation guidelines, safety issues, maintenance, and legal considerations of solar hot water heating systems. The course extends for 60 hours over 3 months.

The Florida Solar Energy Center offers a three day course which covers the essentials of residential solar system design, installation, troubleshooting and operation procedures for residential water and pool heating. This workshop is targeted to contractors, building officials, decision makers, government organizations, practitioners who install solar water heating systems and interested parties. This course includes an installation demonstration of a residential solar water heating system. Emphasis will be placed on system applications, design, sizing, and installation requirements.

Specific objectives of this course include developing the participant's ability to:

> Determine site selection, system applications, characteristics and considerations of the various system types.
> Describe the function of system components, collector and system certification.
> Determine available system sizing, installation, flashing and sealing methods.
> Understand the FSEC and SRCC installation guidelines.
> Demonstrate installation of residential solar water and pool heating system components.
> Evaluate, troubleshoot, and maintain solar water heating systems.
> Monitoring of both residential and commercial systems.

Penn Foster Career School offers a distance-education course in plumbing. The learner acquires the skills one needs to become a professional Plumber.

Hands-on plumber training includes the competencies included in this Qualification:

> Interpret construction drawings and specifications.
> Assemble, install, test, and maintain plumbing systems.
> Repair and maintain water heating systems.
> Install and troubleshoot the plumbing for dishwashers and other appliances.

ProTrain Online offers a course entitled Fundamentals of Solar Hot Water Heating:

This online course concentrates on the basics of installing code compliant solar hot water systems. This course will be useful for people who currently work in or plan to be employed in the solar hot water industry. Student technicians will learn practical design criteria, installation guidelines, safety issues, maintenance, and legal considerations of solar hot water heating systems. 60 hours. Instructor mentored. The duration of the course is six weeks.

The essential training objective of this course is to provide the solar hot water installer/technician/contractor with fundamental technical knowledge on solar assisted heating in order that the technician may acquire and advance in design, installation and servicing responsibilities as the market for solar assisted water heating progresses.

Upon completion of the course, the student technician should be able to:

> Recognize the various types of residential solar hot water heating systems and components currently in use.
> Demonstrate safe working practices.
> Distinguish between solar system freeze protection options.
> Properly design and size residential solar hot water heating systems.
> Assist in the planning and installation of solar collectors and components.
> Understand the types of codes and standards that apply to the proper installation of solar heating systems.
> Understand the types of permits, warranties, and the customer relations required for completion of the overall solar project.
> Assist in the servicing of common solar assisted heating problems.
> Improve the quality of installations.

Outline of the course:

> Lesson 1: Introduction to Solar Hot Water Heating Systems.
> Lesson 2: Solar Heating of Domestic Hot Water.
> Lesson 3: Solar Hot Water Heating Components.
> Lesson 4: Capturing the Sun.
> Lesson 5: Planning & Sizing Solar Hot Water Heating Systems.
> Lesson 6: Working Safely with Solar Hot Water.
> Lesson 7: Installing Solar Hot Water Systems.
> Lesson 8: Solar Space Heating Basics.
> Lesson 9: Service & Maintenance.
> Lesson 10: Legal Responsibilities & Building Codes.

The United Kingdom:

There are many institutions that offer training in plumbing, which includes the installation of hot and cold water systems and the installation of solar water heating systems.

MET-UK is the UK's leading construction training and work placement provider. They "work backwards" by designing courses with employers and changing industry regulations in mind.

MET-UK offers the Solar Domestic Hot Water Heating Systems Course.

Suitability: The course is aimed at existing Plumbers/Gas Engineers wanting to take advantage of the expanding solar market and is made up of a mix of practical and theory training at MET-UK's Centre of Excellence.

Course Content:

BPEC (Level 3) Solar Domestic Hot Water Heating Systems:

> Introduction to solar heating.
> Hot water storage and key installation issues.
> Plumbing layout and design of solar water heating systems.
> Control and power requirements.
> Solar collectors.
> Preparing to install a solar heating system.
> Fitting solar collectors.
> System commissioning and handover to client.

The institution called City and Guilds offers the Plumbing Technical Certificate (6129):

> Introduction.
> Key Plumbing Principles.
> Cold Water Systems.
> Central Heating Systems.
> Above ground discharge systems.
> Effective working relationships.
> System maintenance and de-commissioning.
> Health and Safety.
> Common Plumbing processes.
> Hot water systems.
> Electricity.
> Sheet lead work.

> Environmental awareness.
> Bathroom planning and system design.

The organisation called the Construction Training Services offers a course called the City & Guilds Level 2 Certificate in Basic Plumbing Studies.

The qualification structure is as follows:

> Safety in Plumbing Activities.
> Key Plumbing Principles.
> Common Plumbing Processes.
> Cold Water Systems.
> Domestic Hot Water Systems.
> Sanitation Systems.
> Central Heating Systems (Pipework Only).
> Electrical Supply and Earth Continuity.
> Sheet Lead Weathering.
> Environmental Awareness in Plumbing.
> Effective Working Relationships in the Plumbing Industry.
> Basic Plumbing Studies Core Underpinning Knowledge (Question Paper).
> Basic Plumbing Studies Practical Tasks.

IT Power Ltd is addressing problems regarding a shortage of knowledgeable and suitably qualified installers to carry out these installations. Their idea is to devise a course of recognised and auditable quality, providing theoretical and practical training to potential installers of solar water heating systems. A key problem is that solar water heating is not a major component of nationally recognised vocational qualifications. Courses that do exist have varying content and adopt different teaching approaches. By devising a course through a recognised certification scheme in the plumbing and heating industry, a consistency in subjects taught is ensured.

Moreover, by striking a careful balance between theory and practice, installers are given the experience vital for the proper installation of these systems. The course is being devised with the option for accreditation through ISPQ Europe. This organisation is involved in the development of standards for the installation of renewable energy systems.

Canada:

PCDI Canada, which is a respected, worldwide leader in distance education, offers a course in plumbing similar to the one offered by Ashworth High School College in the US. It is comprehensive course that includes much more than just the installation of hot water systems (as in this qualification). The overlap between this Qualification and Ashworth's extends to:

> Selecting, using, and maintaining the right tools.
> Health and safety.
> Handling ladders, scaffolds, ropes, and hoisting devices.
> Installing pipes.
> Installing hot water systems.

RETScreen International Clean Energy Decision Support Centre of Canada also provides web-based training in solar heating. Included in their training are examples from Lesotho and Botswana. While some of their training is at the level of this Qualification much of it is at a higher level.

Lithuania:

UAB Viessmann organizes regular (two times per month) courses for solar heating installers and planners. Target groups of the courses are heating engineers, installers, energy planners and developers, and energy consulting personnel. It is one-day course, which included theoretical and practical lectures. The content of the lectures is as follows:

Theoretical part:

> Solar radiation energy (renewable energy sources and potential of solar energy in Lithuania).
> Methods of solar energy usage (passive and active).
> Type of solar heating systems and construction.
> Installation possibilities of solar heating systems, practical examples.
> Technological principles of solar heating systems operation (hydraulic schemes, hot water production).
> Accessories of solar heating system and installation.
> Requirements and guidance of solar heating system design and installation (selection of solar heating system, required heating surface, bleeder, calculation of tube diameters and circulation pump etc).

Practical part:

> Demonstration example of solar heating system and explanation of the operating principles.
> Failures identification and removal.

Target students include solar installers, plumbers, heating engineers, housing and building developers and other energy companies. Each trainee is expected to have plumbing and basic electrical skills before starting a course in the installation and layout of heat pump systems. For plumbing, these skills include cutting pipe, soldering pipe joints, gluing pipe joints, lagging, sealing fittings, testing for leaks and installation of heating systems. In regard to electrical aspects, the installer should be familiar with basic electrical concepts and terms.

Denmark:

SOLARGE is a European co-operation project - supported by the Intelligent Energy Europe programme of the European Union - to open up markets for large collective solar thermal systems for multi-family buildings, hotels, public and social buildings. Its main office is in Denmark. SOLARGE offers training and assistance to installers of solar thermal systems. Training material for educational measures has been produced within the SOLARGE project. As follows there is an overview of the slides that have been produced within SOLARGE.

The following training information is available - just the information relevant to this Qualification has been chosen:

> SOLARGE course on CSTS 01 Introduction:
> Chapter 1: Introduction.

> SOLARGE course on CSTS 2 Basics:
> Chapter 2: Basics.

> SOLARGE course on CSTS 06 Collector Field:
> Chapter 6: Collector Field.

> SOLARGE course on CSTS07 - Further Components:
> Chapter 7: Further Components.

> SOLARGE course on CSTS 08 Mounting and Initial Operation:
> Chapter 8: Mounting and Initial Operation.

Qatar, Saudi Arabia, Oman, Israel and Kuwait were also investigated because these are very hot countries and the use of solar energy would significantly reduce dependence on electricity and other sources of energy. However, not much information on training in solar collector installation is available even though Israel leads in the per capita usage of solar water heating systems. Companies that sell solar thermal products conduct their own in-house training.

India is a rising technological giant and the country is making significant attempts to use solar energy. In some areas no new buildings may be built unless solar collectors are installed. Again, not much information on training could be obtained.

Taiwan is a significant producer of solar heating products but information on training and qualifications is not available.

China:

This country is a huge market for solar heating systems. While information on qualifications and training programmes is limited the Standards for Solar Water Heaters Orientation Workshop was held several years ago. The workshop was organized by the Chinese Standard Research Center and supported by the SETC UNDP/GEF Project. The workshop was devised by a project working group (consisting of China National Institute of Standardization, Beijing Solar Energy Research Institute, Profession Committee of the Exploitation of Solar Energy of Chinese Society for Energy Sources of the Countryside) set up to ensure effective implementation of activities in this arena. According to the presentations made by experts at the workshop, a rough list was made of the standards needed to be developed:

> Technical specifications for the design, installation, checking and accepting for solar water heating system.
> Technical specifications for flat type solar water heaters.
> Testing method for the performance of flat type solar water heaters.
> Testing method for the reliable and enduring ability of vacuum tube solar water heaters.
> Testing method for the performance of vacuum tube solar water heaters.
> Technical specifications for vacuum tube solar water heaters.
> Testing method for quality and safety requirements of the component (mainly water tank) of solar water heaters.

The Mediterranean Renewable Energy Centre (MEDREC) operates in Algeria, Egypt, Tunisia and Morocco in many projects, including the utilization of solar thermal energy. However, no information on training of solar heating installers is available.

Egypt:

Through the United Nations Development Programme, three projects were initiated to install solar water heaters in poor areas of El Menia. Not much is available about training programmes per se but there was some capacity building for community members regarding the installation and maintenance of solar heaters.

Uganda:

The Denmark-based Nordic Folkecenter for Renewable Energy is a non-profit, independent, organization that provides research, development of technology, training and information for the manufacture, industrial innovation and implementation of renewable energy technologies and energy savings in Denmark and throughout the world. Nordic Folkecenter conducts various types of training in Uganda and one of their courses is a "Training Workshop on Solar Water Heating systems". The duration of the course is one week and it is for foreign immigrants in Denmark, including Ugandans. The nature of the training is not specified.

Ghana, Nigeria, Botswana and Zimbabwe were also considered but the information on qualifications and training is not available. Training is carried out by international companies whose products are sold in these countries.

Conclusion:

While there are many training programmes or short courses in the countries investigated, no country offers the kind of extended training envisaged by this Qualification. This Qualification not only addresses the installation of solar water systems but the installation of cold and hot water systems. In addition, the Qualification addresses a number of related aspects like health and safety, use of access equipment and harnesses and basic first aid.

***ARTICULATION OPTIONS***

Horizontal Articulation:

> ID 61689: National Certificate: Community Water, Health and Sanitation Promotion at NQF Level 2.
> ID 49410: National Certificate: Construction at NQF Level 2.
> ID 24273: National Certificate: Community house building at NQF Level 2.

Vertical Articulation:

> ID 24295: National Certificate: Timber Roof Erecting at NQF Level 3.
> ID 60190: National Certificate: Water and Wastewater Process Control at NQF Level 3.
> ID 60155: National Certificate: Water and Wastewater Reticulation Services at NQF Level 3.

***MODERATION OPTIONS***

> This Qualification and its Unit Standards will be internally assessed and externally moderated by a moderator registered by the relevant accredited ETQA or an ETQA that has a Memorandum of Understanding with the relevant accredited ETQA. Providers should establish or refine existing moderation procedures and systems at their institutions with a view to aligning them with the requirements of the relevant ETQA.

> The learner's performance/results should be moderated by one or more external moderators. Moderators should report not only on the standard of achievement but also on the validity and reliability of the assessment strategies, design and criteria in relation to the Unit Standards and the purpose and Exit Level Outcomes of the Qualification.

> Moderators must be competent at the level of the Qualification and registered with the relevant accredited ETQA to ensure that the standard is consistent. Moderators must also be registered as assessors with the relevant ETQA. A relevant accredited ETQA will monitor and quality assure moderation and assessment according to the guidelines in the Qualification.

> Providers must be accredited to provide this Qualification with the relevant ETQA or ETQA that has a Memorandum of understanding in place with the relevant ETQA.

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

> Assessors must be registered as assessors with a relevant accredited ETQA. Providers must also be accredited as providers with a relevant accredited ETQA. Providers will primarily use their own qualified staff as assessors but may, if they wish make use of tutors and/or outside accredited assessors or assessment agencies provided that the provider monitors the process.

> Internal and external assessors must have an appropriate Qualification at least one level above the level of the Qualification or appropriate experience in plumbing.

***NOTES***
N/A

***UNIT STANDARDS***

| | ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|---|---|---|---|---|
| Fundamental | 119463 | Access and use information from texts | Level 2 | 5 |
| Fundamental | 9009 | Apply basic knowledge of statistics and probability to influence the use of data and procedures in order to investigate life related problems | Level 2 | 3 |
| Fundamental | 7480 | Demonstrate understanding of rational and irrational numbers and number systems | Level 2 | 3 |
| Fundamental | 9008 | Identify, describe, compare, classify, explore shape and motion in 2-and 3-dimensional shapes in different contexts | Level 2 | 3 |
| Fundamental | 119454 | Maintain and adapt oral/signed communication | Level 2 | 5 |
| Fundamental | 119460 | Use language and communication in occupational learning programmes | Level 2 | 5 |
| Fundamental | 7469 | Use mathematics to investigate and monitor the financial aspects of personal and community life | Level 2 | 2 |
| Fundamental | 9007 | Work with a range of patterns and functions and solve problems | Level 2 | 5 |
| Fundamental | 119456 | Write/present for a defined context | Level 2 | 5 |
| Core | 229998 | Explain and perform fall arrest techniques when working at height | Level 1 | 2 |
| Core | 9964 | Apply health and safety to a work area | Level 2 | 3 |
| Core | 262786 | Apply plumbing principles as they pertain to the installation of a hot water system | Level 2 | 8 |
| Core | 262765 | Install and test water supply systems | Level 2 | 22 |
| Core | 262784 | Mount solar water heating system | Level 2 | 20 |
| Core | 120496 | Provide risk-based primary emergency care/first aid in the workplace | Level 2 | 5 |
| Core | 14054 | Read and interpret construction drawings and specifications | Level 2 | 3 |
| Core | 261664 | Erect, use and dismantle access equipment for construction work | Level 3 | 6 |
| Elective | 10007 | Identify, analyse and select business opportunities | Level 1 | 3 |
| Elective | 9976 | Apply basic business concepts | Level 2 | 8 |
| Elective | 14556 | Apply productivity principles on a construction site | Level 2 | 6 |
| Elective | 9986 | Apply quality principles on a construction site | Level 2 | 12 |
| Elective | 9982 | Comply with legal requirements for a construction contract | Level 2 | 8 |
| Elective | 246463 | Demonstrate knowledge of water cycle, water and wastewater systems and processes | Level 2 | 5 |
| Elective | 119059 | Install and maintain a below ground drainage system | Level 2 | 10 |
| Elective | 119057 | Install, test and maintain above ground drainage systems | Level 2 | 10 |
| Elective | 14336 | Maintain records on a constuction site | Level 2 | 2 |
| Elective | 119672 | Manage marketing and selling processes of a new venture | Level 2 | 7 |
| Elective | 119670 | Produce a business plan for a new venture | Level 2 | 8 |
| Elective | 12463 | Understand and deal with HIV/AIDS | Level 2 | 3 |

***LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION***
***None***

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Install and test water supply systems***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262765 | Install and test water supply systems | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Civil Engineering Construction | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 22 |

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

SPECIFIC OUTCOME 1
Plan and prepare to install and test water supply systems.

SPECIFIC OUTCOME 2
Install cold water pipes and pipe fittings.

SPECIFIC OUTCOME 3
Install hot water cylinders.

SPECIFIC OUTCOME 4
Test cold and hot water supply systems.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65858 | National Certificate: Hot Water System Installation | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Mount solar water heating system***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262784 | Mount solar water heating system | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Civil Engineering Construction | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 20 |

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

**SPECIFIC OUTCOME** 1
Explain the theory regarding solar heating water systems.

**SPECIFIC OUTCOME** 2
Demonstrate and apply knowledge of roof trusses in order to complete installation of solar water heating system.

**SPECIFIC OUTCOME** 3
Plan and prepare for installation of solar water heating system.

**SPECIFIC OUTCOME** 4
Install solar water heating system according to plumber's instruction.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65858 | National Certificate: Hot Water System Installation | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Apply plumbing principles as they pertain to the installation of a hot water system***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262786 | Apply plumbing principles as they pertain to the installation of a hot water system | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Civil Engineering Construction | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 2 | 8 |

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

**SPECIFIC OUTCOME** 1
Apply principles pertaining to installation of a water system.

**SPECIFIC OUTCOME** 2
Apply basic pipe sizing to plumbing applications/operations.

**SPECIFIC OUTCOME** 3
Describe domestic solar and electrical hot water systems components and materials.

**SPECIFIC OUTCOME** 4
Identify and describe the uses of plumbing tools, components and materials.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65858 | National Certificate: Hot Water System Installation | Level 2 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***QUALIFICATION:***
***Further Education and Training Certificate: Computer Aided Drawing Office Practice (CAD)***

| *SAQA QUAL ID* | *QUALIFICATION TITLE* | | |
|---|---|---|---|
| 66071 | Further Education and Training Certificate: Computer Aided Drawing Office Practice (CAD) | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *QUALIFICATION TYPE* | *FIELD* | *SUBFIELD* | |
| Further Ed and Training Cert | 12 - Physical Planning and Construction | Physical Planning, Design and Management | |
| *ABET BAND* | *MINIMUM CREDITS* | *NQF LEVEL* | *QUAL CLASS* |
| Undefined | 131 | Level 4 | Regular-Unit Stds Based |

***This qualification replaces:***

| Qual ID | Qualification Title | NQF Level | Min Credits | Replacement Status |
|---|---|---|---|---|
| 50018 | Further Education and Training Certificate: Computer Aided Drawing Office Practice | Level 4 | 120 | Will occur as soon as 66071 is registered |

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

Any learners, who are, or wish to be involved in the Computer Aided Drawing, will have access to this qualification. This qualification is intended to serve the architectural, engineering and construction industries by providing skilled draughtspersons who can produce design drawings which address the need to move from traditional manual drafting to Computer Aided Drawing and Draughting. Portability across other National Qualifications in Engineering and Draughting is therefore ensured.

The qualifying learner will be capable of:

> Understanding the Computer Aided Drawing office environment.
> Using Computer Aided Drawing office equipment and instruments.
> Producing Computer Aided drawings.

Rationale:

Computer Aided Design supports the Design Engineering activity that includes creation of 2D/3D Geometric models doing engineering analysis, evaluating the design by simulation and produce rapid drafting for manufacturing with the help of computers. The traditional CAD System offers 2D drafting, 3D modeling with limited modification capability. This system substitutes the drafting board completely. The high end 3D CAD tool provides many solutions under one platform. If alteration is made in one feature then it will automatically change other related (dependent) features. Dimensional and geometrical constrains play a major role in this parametric design technology. Testing the designs on the computer instead of expensive and time-consuming field tests leads to significant reduction in product development cycles. Cost

The FETC in Computer Aided Drawing (CAD) Office Practice is an entry level qualification for the workplace designed in consultation with industry experts. Qualifying learners will gain a broad base of knowledge and skills needed for entry into the industry that will also provide the basis for further learning along this career pathway, including learners who:

> Were previously disadvantaged or who were unable to complete their schooling and were therefore denied access to Further Education and Training.
> Have worked in Computer Aided Drawing for many years, but have no formal qualification in Computer Aided Drawing.
> Wish to extend their range of skills and knowledge of the industry so that they can become knowledgeable workers in Computer Aided Drawing and Draughting.

The FETC in Computer Aided Drawing Office Practice allows the learner to work towards a nationally recognised qualification. The qualification will allow both those in formal education and those already employed in, but not limited to, architectural, engineering and construction organisations access, due to its flexibility. It aims to develop learners who are informed and skilled in Computer Aided Drawing and Draughting.

The FETC in Computer Aided Drawing Office Practice will produce knowledgeable, skilled Computer Aided Draughtspersons who are able to contribute to improved productivity and efficiency within the draughting industry. It will provide the means for current learners in the Computer Aided Drawing field to receive recognition for prior learning and to upgrade their skills and knowledge base. The qualification is structured for learners to acquire a set of core competencies to give a broad understanding of Computer Aided Drawing. The electives will allow for specific competence in a selected area of drawing specialization such as:

> Mining Engineering.
> Mechanical Engineering.
> Surveying.
> Naval Architecture (Ship/boat design).
> Electrical Engineering.
> Interior/spatial design.
> Landscaping.
> Automotive Engineering.
> Structural steel detailing.
> Reinforced Concrete Detailing.
> Piping and plant design.
> Construction.
> Civil/structural Engineering.
> Instrumentation Engineering.
> Engineering and design draughting.
> Air-conditioning and ventilation design.
> Architecture.
> Furniture design.
> Town and regional planning.
> Graphic design.
> Industrial design.
> Aeronautics.

***RECOGNIZE PREVIOUS LEARNING?***
Y

***LEARNING ASSUMED IN PLACE***
It is assumed that learners are already competent in the following:

> Communication at NQF Level 3.
> Mathematical literacy at NQF Level 3.

Recognition of Prior Learning:

The structure of this Unit Standard based Qualification makes the Recognition of Prior Learning possible, if the learner is able to demonstrate competence at the level of unit standards and exit level outcomes as described.

Access to the Qualification:

Access to this qualification is open bearing in mind learning assumed to be in place.

***QUALIFICATION RULES***
The Qualification consists of a Fundamental, a Core and an Elective Component.

> All Fundamental Unit Standards, totaling 56 Credits are compulsory.
> All Core Unit Standards, totaling 53 credits are compulsory.
> The Elective Component consists of clusters of Unit Standards related to 5 areas of specialization. Learners are to choose all Unit Standards related to at least one specialization stream as clustered below (Minimum of 22 credits).

Mechanical drawings (31 credits):

> ID 263014: Demonstrate an understanding of production, manufacturing and construction processes as it affects the drawing, NQF Level 5, 3 credits.
> ID 263013: Demonstrate an understanding of engineering materials and processes, NQF Level 5, 6 credits.
> ID 263012: Demonstrate an understanding of various mechanical components, NQF Level 5, 10 credits.
> ID 262944: Interpret, read and produce mechanical drawings, NQF Level 4, 12 credits.

Electrical, Air conditioning, Vent duct and plant drawings (29 credits):

> ID 263014: Demonstrate an understanding of production, manufacturing and construction processes as it affects the drawing, NQF Level 5, 3 credits.
> ID 263013: Demonstrate an understanding of engineering materials, heat treatment and machinery, NQF Level 5, 6 credits.
> ID 263012: Demonstrate an understanding of various mechanical components, NQF Level 5, 6 credits.
> ID 263006: Interpret, read and produce electrical drawings, NQF Level 4, 8 credits.
> ID 120201: Identify, interpret and produce working air conditioning and ventilation duct and plant drawings, NQF Level 4, 6 credits.

Architectural and civil construction draughting (22 credits):

> ID 11637: Set up a survey instrument to take observations, level 3, 4 credits.
> ID 262985: Interpret, read and produce architectural draughting drawings, NQF Level 4, 18 credits.

Concrete reinforcing and structural steel drawings (30 credits):

> ID 262965: Interpret, read and produce structural steel drawings for workshop fabrication, NQF Level 4, 12 credits.
> ID 120198: Interpret, read and produce reinforced concrete detail drawings, NQF Level 4, 12 credits.

> ID 243086: Draw and interpret complex plate, pipe and structural steel plate, pipe and structural steel drawings, NQF Level 3, 6 credits.

Piping drawings (37 credits):

> ID 253592: Identify, interpret and produce working piping drawings, NQF Level 4, 6 credits.
> ID 254076: Demonstrate knowledge of hydraulics and flow measurement in water and wastewater systems, NQF Level 3, 12 credits.
> ID 263012: Demonstrate an understanding of various mechanical components, NQF Level 5, 10 credits.
> ID 253588: Perform piping offset calculations, NQF Level 3, 5 credits.
> ID 244093: Read and interpret process and instrumentation diagrams, NQF Level 3, 4 credits.

***EXIT LEVEL OUTCOMES***
1. Operate a computer to produce 2D and 3D working drawings.

2. Apply drawing office practice.

3. Plan and monitor drawing office workflow process.

4. Produce freehand drawings.

***ASSOCIATED ASSESSMENT CRITERIA***
Associated Assessment Criteria for Exit Outcome Level 1:

1.1 Client requirements are interpreted and Computer Aided Drawing software is activated and customized according to software commands and applications.
1.2 A detailed 2D Computer Aided Drawing is produced according to client's confirmed requirements, software functions and drawing office procedures within agreed time frame.
1.3 A 3D Computer Aided Drawing is produced according to client's verified requirements, software functions and drawing office procedures within agreed time frame.
1.4 Administrative and office procedures are conducted in terms of produced drawings according to organisational requirements.

Associated Assessment Criteria for Exit Outcome Level 2:

2.1 Historical development of drawings is described in relation to major influences and trends that impact on current drawing office practice.
2.2 Drawing office organogram and layout is described and the use of equipment is explained in terms of their function and safety requirements.
2.3 Drawing office administration and cost implications of reproductions and revisions are explained in relation to drawing office procedures.
2.4 Occupational, health, safety and housekeeping requirements are applied in terms of drawing office practice.

Associated Assessment Criteria for Exit Outcome Level 3:

3.1 A computer system is set up, customized, used and maintained in relation to the software and hardware applications, manufacturer's instructions and drawing office procedures.
3.2 The nature and scope of planning and scheduling of work processes are explained in relation to a drawing office.
3.3 Workflow process is planned and scheduled in terms of the sourced data, work activities, resources and facilities in required format within given time frame.
3.4 The achievement of the workflow plan is monitored and adjusted as necessary in accordance with requirements and within agreed time frames.

Associated Assessment Criteria for Exit Outcome Level 4:

4.1 Drawing office measuring instruments are used and maintained according to manufacturer's instructions.
4.2 Client brief is interpreted and technical data is recorded according to organizational procedures.
4.3 On-site information and data is applied to the design in conformation to standards and code of practice for engineering.
4.4 A free hand drawing and 3D model is produced for client approval of design according to drawing office procedures.

Integrated Assessment:

The importance of integrated assessment is to confirm that the learner is able to demonstrate applied competence (practical, foundational and reflexive) and ensure that the purpose of this Qualification is achieved. Both formative and summative assessment methods and strategies are used to ensure that the Exit Level Outcomes and the purpose of the Qualification are achieved through achieving the Unit Standards. Learning, teaching and assessment are inextricably linked.

Learning and assessment should be integrated and assessment practices must be fair, transparent, valid and reliable. A variety of assessment strategies and approaches must be used. This could include tests, assignments, projects, demonstrations and/or any applicable method. Evidence of the acquisition of competencies must be demonstrated through the Unit Standards, which enhance the integration of theory and practice as deemed appropriate at this level.

Formative assessment is an on-going process which is used to assess the efficacy of the teaching and learning process. It is used to plan appropriate learning experiences to meet the learner's needs. Formative assessments can include a mix of simulated and actual (real) practice or authentic settings. Feedback from assessment informs both teaching and learning. If the learner has met the assessment criteria of all the Unit Standards then s/he will have achieved the Exit Level Outcomes of the Qualification.

Summative assessment is concerned with the judgement of the learning in relation to the Exit Level Outcomes of the Qualification. Such judgement must include integrated assessment(s) which test the learner's ability to integrate the larger body of knowledge, skills and attitudes, which are represented by the Exit Level Outcomes. Summative assessment can take the form of oral, written and practical examinations as agreed to by the relevant ETQA.

Integrated assessment must be designed to achieve the following:

> An integration of the achievement of the Exit Level Outcomes in a way that reflects a comprehensive approach to learning and shows that the purpose of the Qualification has been achieved.
> Judgement of learner performance to provide evidence of applied competence or capability.

Assessors and moderators should make 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.

Assessment should ensure that all specific outcomes, embedded knowledge and critical cross-field outcomes are assessed. The assessment of the critical cross-field outcomes should be integrated with the assessment of specific outcomes and embedded knowledge.

***INTERNATIONAL COMPARABILITY***

The most common type of training in Computer Aided Design (CAD) worldwide takes the form of short courses that are offered by CAD software manufacturers and distributors. Each of these CAD software brands offer buyers demonstrations, on-line training, help facilities as well as training that caters only for the operation of the software in terms of its functions.

The focus of this benchmarking exercise is focused on qualifications that offer the qualifying learner a range of competencies that go beyond the operation of particular CAD software to include knowledge and skills that are required to practice in the work environment of a CAD office. Examples of similar structured qualifications were considered from the following countries:

> United Kingdom.
> New Zealand.
> United States of America.

United Kingdom:

The Level 3 NVQ in Design and Draughting (Reference Number 100/3323/3) is similar to the South African Further Education and Training Certificate in CAD Office Practice in terms of the purpose of the qualification and the broad outcomes described in these qualifications. The level of complexity and duration of study is also very similar.

The aim of this qualification is to validate the competence of the site-based workforce of the engineering construction industry against national standards. The qualification focuses on the skills craftsperson's need in their daily working life, giving employer's confidence in the level of competence of their employers. This qualification is currently being used by industry. Candidates must complete all core units and one optional unit.

Core Units:

> A/102/1519: Contribute to effective working relationships.
> M/102/1520: Work safely, minimize risk and comply with emergency procedures.
> H/102/1501: Read and extract information from engineering drawings and specifications.
> K/102/1502: Identify and assess factors that impact on engineering design briefs.
> M/102/1503: Complete chosen engineering designs.
> T/102/1504: Review technical information to produce detailed engineering drawings.
> A/102/1505: Produce detailed drawings to support engineering activities.
> F/102/1506: Minimise risk to life, property and the environment within a design and draughting context.
> J/102/1507: Generate and evaluate engineering design options.

Optional Units:

> J/102/1510: Develop design options.
> L/102/1511: Communicating design options.

New Zealand:

The National Certificate in Design (Draughting) (Level 2) [Ref: 0640] (70 credits) is designed for people who are entering the draughting sector of the design industry. It is a combination of theoretical and practical skills which can be acquired on or off job.

Core unit standards (50 credits):

> ID 7481: Produce design ideas and images using computer graphics programs, Level 2, 3 credits.
> ID 7482: Produce orthographic, scale working drawings using computer aided draughting (CAD) programs, Level 2, 3 credits.
> ID 7483: Produce scale production drawings using computer aided draughting (CAD) programs, Level 3, 5 credits.
> ID 7484: Produce and deliver a multi-media presentation, Level 4, 5 credits.
> ID 7485: Interpret a design brief, and select and present information for solutions, Level 1,3 credits.
> ID 7488: Present design material, Level 1, 3 credits.
> ID 7492: Present design work, Level 2, 3 credits.
> ID 7496: Prepare, plan, and present design project work, Level 3, 4 credits.
> ID 15730: Produce conceptual design ideas, Level 4, 15 credits.
> ID 15348: Demonstrate knowledge of numerical data used in the draughting industry, Level 2, 6 credits.

Elective unit standards (20 credits):

> Describe and operate a personal computer system.
> Demonstrate knowledge of the application and impact of information technology.
> Protect health and safety in the workplace.
> Communicate information in a specified workplace.
> Participate in groups and/or teams to gather ideas and information.
> Read texts for practical purposes.
> Write a technical report.
> Investigate a chemical process.
> Demonstrate knowledge of atomic structure.
> Demonstrate knowledge of thermodynamics.
> Demonstrate knowledge of reaction rates and mechanisms.
> Demonstrate knowledge of the behaviour of gases.
> Demonstrate knowledge of linear motion.
> Demonstrate knowledge of energy transformations.
> Demonstrate knowledge of atomic structure and fission reactions.
> Demonstrate knowledge of energy, momentum and equilibrium.
> Demonstrate knowledge of the physics of the properties of materials under stress.
> Demonstrate knowledge of heat and temperature.

United States of America:

An example of an equivalent qualification is the Computer Aided Design (CAD) Technology Program (60 Credit Hours) offered by Truman College, Chicago provides the technical instruction and skill development for the student to become successfully employed in the drafting fields of the mechanical, architectural and construction industry. Instruction is directed toward theoretical and technical skills in the use of modern drafting tools and equipment. Emphasis is placed on the training of computer aided design (CAD) technologies.

Besides the 17 credit hours assigned to General Education Requirements or the fundamentals, which includes "Communications"(English 101) and "General Education" (Math 101); much like the South African qualification, the following core and elective module titles apply:

CAD Technology:

> 0130: Technical Illustration.
> 0170: Computer-Aided Design I for Mechanical Design Technicians.
> 0171: Computer-Aided Design II for Mechanical Design Technicians.

> 0172: Computer-Aided Design III for Mechanical Design Technicians.

Computer Information Systems:

> 0103: Introduction to Basic Language.
> 0116: Introduction to Operating Systems.
> 0123: Introduction to Spreadsheets on Microcomputers.

Engineering:

> 0100: Elements of Engineering Drawing.
> 0110: Introductory Drafting.
> 0111: Introduction to the Engineering Profession.
> 0131: Engineering Graphics and Introduction to Design.
> 0132: Descriptive Geometry.
> 0190: Computer Applications in Engineering.
> 0202: Advanced Drafting and Basic Machine Design.

Conclusion:

All the qualifications described above reflect both similarities and differences with the South African Further Education and Training Certificate in CAD Office Practice. The glaring difference lies in the approach to the elective component of the qualifications. The South African approach is unique in that is offers a choice of applying CAD Practice in five areas of specialization within the Civil Engineering Construction workplace: Mechanical drawings, Electrical, Air conditioning, Vent duct and plant drawings, Architectural and civil construction draughting, Concrete reinforcing and structural steel drawings and Piping drawings.

The ability to read, interpret and produce 2D and 3D civil engineering drawings lies at the heart of these qualifications. While these qualifications differ in the terms used to categorise learning areas as modules, subjects and units; the nature and extent of the competencies are captured at the level of unit standards, specific outcomes, assessment criteria and embedded knowledge in the South African unit standards.

***ARTICULATION OPTIONS***
This qualification lends itself to both horizontal and vertical articulation. Examples of horizontal articulation are:

> ID 21149: Certificate: AutoCAD, NQF Level 4.
> ID 49127: Further Education and Training Certificate: Design Foundation, NQF Level 4.

Examples of vertical articulation are:

> ID 24317: Certificate: Project Design, NQF Level 5.
> ID 36015: Higher Diploma: Interior design and CAD, NQF Level 6.

***MODERATION OPTIONS***
> Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with the relevant Education, Training, Quality, and Assurance (ETQA) Body.

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

> Assessment and moderation of assessment will be overseen by the relevant ETQA according to the ETQA's policies and guidelines for assessment and moderation; in terms of agreements

reached around assessment and moderation between ETQA's (including professional bodies); and in terms of the moderation guideline detailed immediately below.

> Moderation must include both internal and external moderation of assessments at exit points of the Qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual unit standards, the integrated competence described in the Qualification and will include competence within core sales and the elective standards relevant to the economic sector.

Anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution that is accredited by the relevant ETQA.

***CRITERIA FOR THE REGISTRATION OF ASSESSORS***
For an applicant to register as an assessor, the applicant needs:

> A relevant Qualification at NQF Level 5 or higher.
> To be registered as an assessor with the relevant ETQA.

***NOTES***
This qualification replaces qualification 50018, "Further Education and Training Certificate: Computer Aided Drawing Office Practice", Level 4, 120 credits.

***UNIT STANDARDS***

| | ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|---|---|---|---|---|
| Fundamental | 119472 | Accommodate audience and context needs in oral/signed communication | Level 3 | 5 |
| Fundamental | 119466 | Interpret a variety of literary texts | Level 3 | 5 |
| Fundamental | 119457 | Interpret and use information from texts | Level 3 | 5 |
| Fundamental | 119465 | Write/present/sign texts for a range of communicative contexts | Level 3 | 5 |
| Fundamental | 9015 | Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life related problems | Level 4 | 6 |
| Fundamental | 7484 | Describe, represent, analyse and explain changes in shape and motion in 2- and 3-dimensional space with justification | Level 4 | 4 |
| Fundamental | 119470 | Evaluate literary texts | Level 4 | 5 |
| Fundamental | 119461 | Make and motivate judgements on selected literary texts | Level 4 | 5 |
| Fundamental | 119469 | Read/view, analyse and respond to a variety of texts | Level 4 | 5 |
| Fundamental | 7468 | Use mathematics to investigate and monitor the financial aspects of personal, business, national and international issues | Level 4 | 6 |
| Fundamental | 119459 | Write/present/sign for a wide range of contexts | Level 4 | 5 |
| Core | 8016 | Maintaining occupational health, safety and general housekeeping | Level 3 | 8 |
| Core | 114979 | Operate a computer workstation in a business environment | Level 3 | 2 |
| Core | 120199 | Set up and prepare 3D model space and produce a 3D model | Level 3 | 6 |
| Core | 262966 | Demonstrate an understanding of drawing office practice | Level 4 | 6 |
| Core | 263023 | Demonstrate an understanding of measuring instruments used in Computer Aided Drawing (CAD) practice | Level 4 | 5 |
| Core | 263024 | Plan and produce two dimensional (2D) Computer Aided Drawings (CAD) | Level 4 | 15 |
| Core | 263064 | Plan and schedule workflow | Level 4 | 3 |
| Core | 263046 | Represent client requirements in a free hand drawing and scale model | Level 4 | 8 |
| Elective | 254076 | Demonstrate knowledge of hydraulics and flow measurement in water and wastewater systems | Level 3 | 12 |
| Elective | 243086 | Draw and interpret complex plate, pipe and structural steel plate, pipe and structural steel drawings | Level 3 | 6 |
| Elective | 253588 | Perform piping off-set calculations | Level 3 | 5 |

| | ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|---|---|---|---|---|
| Elective | 244093 | Read and interpret process and instrumentation diagrams | Level 3 | 4 |
| Elective | 11637 | Set up a survey instrument to take observations | Level 3 | 4 |
| Elective | 120201 | Identify, interpret and produce working air conditioning and ventilation duct and plant drawings | Level 4 | 6 |
| Elective | 263006 | Interpret, read and produce electrical working drawings | Level 4 | 8 |
| Elective | 262944 | Interpret, read and produce mechanical drawings | Level 4 | 12 |
| Elective | 262984 | Interpret, read and produce reinforced concrete detailed drawings | Level 4 | 12 |
| Elective | 262965 | Interpret, read and produce structural steel drawings for workshop fabrication | Level 4 | 12 |
| Elective | 262985 | Read, interpret and produce working architectural drawings | Level 4 | 18 |
| Elective | 263013 | Demonstrate an understanding of engineering materials and processes | Level 5 | 6 |
| Elective | 263012 | Demonstrate an understanding of mechanical components | Level 5 | 10 |
| Elective | 263014 | Demonstrate an understanding of production, manufacturing and construction processes as it affects the drawing | Level 5 | 3 |

***LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION***
***None***

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Interpret, read and produce mechanical drawings***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262944 | Interpret, read and produce mechanical drawings | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 12 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14495 | Identify, interpret and produce working mechanical drawings | Level 4 | 8 | Will occur as soon as 262944 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate an understanding of conventional representation for mechanical draughting.

**SPECIFIC OUTCOME** 2
Draw cam profiles.

**SPECIFIC OUTCOME** 3
Produce sectional drawings.

**SPECIFIC OUTCOME** 4
Produce detailed mechanical drawings.

**SPECIFIC OUTCOME** 5
Produce an assembly drawing.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Interpret, read and produce structural steel drawings for workshop fabrication***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262965 | Interpret, read and produce structural steel drawings for workshop fabrication | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 12 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14497 | Identify, interpret and produce working structural steel drawings | Level 4 | 8 | Will occur as soon as 262965 is registered |

**SPECIFIC OUTCOME** 1
Demonstrate an understanding of structural steel detailing.

**SPECIFIC OUTCOME** 2
Apply knowledge of beams, plates and box girders to produce a workshop fabrication drawing.

**SPECIFIC OUTCOME** 3
Identify and detail bolted and welded columns.

**SPECIFIC OUTCOME** 4
Identify and detail bolted and welded latticed girders.

**SPECIFIC OUTCOME** 5
Identify and detail welded and bolted roof trusses.

**SPECIFIC OUTCOME** 6
Identify and detail bracings.

**SPECIFIC OUTCOME** 7
Identify and detail portal frames.

**SPECIFIC OUTCOME** 8
Compile fabrication documentation.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Demonstrate an understanding of drawing office practice***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262966 | Demonstrate an understanding of drawing office practice | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 6 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14476 | Apply drawing office administration procedures | Level 4 | 3 | Will occur as soon as 262966 is registered |
| 14478 | Demonstrate an understanding of drawing office orientation | Level 4 | 2 | Will occur as soon as 262966 is registered |

**SPECIFIC OUTCOME** 1
Explain the history and development of drawing.

**SPECIFIC OUTCOME** 2
Identify and describe drawing office layout and equipment.

**SPECIFIC OUTCOME** 3
Demonstrate an understanding of drawing office administration procedures.

**SPECIFIC OUTCOME** 4
Understand cost implications for elements of administration.

**SPECIFIC OUTCOME** 5
Distribute drawing according to organisational requirements.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Interpret, read and produce reinforced concrete detailed drawings***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262984 | Interpret, read and produce reinforced concrete detailed drawings | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 12 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 120198 | Identify, interpret and produce working reinforced concrete detail drawings | Level 4 | 10 | Will occur as soon as 262984 is registered |

**SPECIFIC OUTCOME** 1
Understand reinforced concrete detailing.

**SPECIFIC OUTCOME** 2
Produce detailed concrete reinforcing drawings.

**SPECIFIC OUTCOME** 3
Compile drawings to detail and position columns and piles.

**SPECIFIC OUTCOME** 4
Compile detailed floor slab drawing.

**SPECIFIC OUTCOME** 5
Produce detailed drawings for staircases.

**SPECIFIC OUTCOME** 6
Produce and present bending schedules.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Read, interpret and produce working architectural drawings***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262985 | Read, interpret and produce working architectural drawings | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 18 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14490 | Identify, interpret and produce working building drawings | Level 4 | 8 | Will occur as soon as 262985 is registered |
| 120213 | Read, interpret and produce working civil construction drawings | Level 4 | 8 | Will occur as soon as 262985 is registered |
| 252062 | Explain and use construction drawings and interpret specifications | Level 5 | 10 | Will occur as soon as 262985 is registered |

**SPECIFIC OUTCOME** 1
Explain Building Practice in relation to architectural drawing.

**SPECIFIC OUTCOME** 2
Read and interpret working architectural drawings.

**SPECIFIC OUTCOME** 3
Use drawings to interpret the structure of a building.

**SPECIFIC OUTCOME** 4
Produce construction drawings.

**SPECIFIC OUTCOME** 5
Verify that information from drawings conform to the construction activities.

**SPECIFIC OUTCOME** 6
Issue, use and store architectural drawings.

**SPECIFIC OUTCOME** 7
Submit architectural drawings for approval to a local authority.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Interpret, read and produce electrical working drawings***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263006 | Interpret, read and produce electrical working drawings | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14489 | Identify, interpret and produce electrical working drawings | Level 4 | 8 | Will occur as soon as 263006 is registered |

**SPECIFIC OUTCOME** 1
Explain the principles of electricity and the purpose of electrical draughting.

**SPECIFIC OUTCOME** 2
Explain the generation and distribution of electricity.

**SPECIFIC OUTCOME** 3
Explain wiring of premises.

**SPECIFIC OUTCOME** 4
Define and draw electrical/electronic graphic symbols and diagrams.

**SPECIFIC OUTCOME** 5
Describe and draw the control and protection of electric motors.

**SPECIFIC OUTCOME** 6
Demonstrate an understanding of interior and exterior lighting design.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Demonstrate an understanding of mechanical components***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263012 | Demonstrate an understanding of mechanical components | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 5 | 10 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14488 | Demonstrate an understanding of various mechanical components | Level 5 | 6 | Will occur as soon as 263012 is registered |

SPECIFIC OUTCOME 1
Demonstrate an understanding of keys, pulleys, shaft couplings and screw threads.

SPECIFIC OUTCOME 2
Demonstrate an understanding of bearings and lubrication.

SPECIFIC OUTCOME 3
Demonstrate an understanding of gears and gear drives.

SPECIFIC OUTCOME 4
Demonstrate an understanding of valves, pumps and pipe fittings.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Demonstrate an understanding of engineering materials and processes***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263013 | Demonstrate an understanding of engineering materials and processes | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 5 | 6 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14485 | Demonstrate an understanding of engineering materials, heat treatment and machinery | Level 5 | 6 | Will occur as soon as 263013 is registered |

**SPECIFIC OUTCOME** 1
Explain the nature and use of ferrous and non-ferrous metals.

**SPECIFIC OUTCOME** 2
Explain the nature and use of ferrous and non-ferrous alloys.

**SPECIFIC OUTCOME** 3
Explain the nature and use of thermo-plastic and thermosetting plastics.

**SPECIFIC OUTCOME** 4
Explain machining principles and processes in engineering.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Demonstrate an understanding of production, manufacturing and construction processes as it affects the drawing***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263014 | Demonstrate an understanding of production, manufacturing and construction processes as it affects the drawing | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 5 | 3 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14469 | Demonstrate an understanding of production, manufacturing and construction processes as it affects the drawing | Level 5 | 5 | Will occur as soon as 263014 is registered |

SPECIFIC OUTCOME 1
Describe and explain the drawing route through the process.

SPECIFIC OUTCOME 2
Explain the process.

SPECIFIC OUTCOME 3
Describe parameters in which material is used.

SPECIFIC OUTCOME 4
Determine sizes, volume and mass of components within the drawing.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Elective | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Demonstrate an understanding of measuring instruments used in Computer Aided Drawing (CAD) practice***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263023 | Demonstrate an understanding of measuring instruments used in Computer Aided Drawing (CAD) practice | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 5 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14486 | Demonstrate an understanding of measuring instruments and produce free-hand drawings | Level 4 | 3 | Will occur as soon as 263023 is registered |

**SPECIFIC OUTCOME 1**
Describe the functions of measuring instruments.

**SPECIFIC OUTCOME 2**
Use measuring instruments to obtain measurements as per specifications.

**SPECIFIC OUTCOME 3**
Store and maintain measuring instruments.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Plan and produce two dimensional (2D) Computer Aided Drawings (CAD)***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263024 | Plan and produce two dimensional (2D) Computer Aided Drawings (CAD) | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 15 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14471 | Plan drawing layout | Level 4 | 6 | Will occur as soon as 263024 is registered |
| 14473 | Develop and produce computer aided drawings | Level 4 | 4 | Will occur as soon as 263024 is registered |

**SPECIFIC OUTCOME** 1
Prepare the computer environment for using CAD software.

**SPECIFIC OUTCOME** 2
Prepare to produce a 2D computer aided drawing.

**SPECIFIC OUTCOME** 3
Verify the interpretation of job requirements.

**SPECIFIC OUTCOME** 4
Produce a detailed computer aided drawing.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Represent client requirements in a free hand drawing and scale model***

| ***SAQA US ID*** | ***UNIT STANDARD TITLE*** | | |
|---|---|---|---|
| 263046 | Represent client requirements in a free hand drawing and scale model | | |
| ***ORIGINATOR*** | | ***PROVIDER*** | |
| SGB Civil Engineering Construction | | | |
| ***FIELD*** | | ***SUBFIELD*** | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| ***ABET BAND*** | ***UNIT STANDARD TYPE*** | ***NQF LEVEL*** | ***CREDITS*** |
| Undefined | Regular | Level 4 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14467 | Establish client requirements and gather and apply required design information | Level 4 | 6 | Will occur as soon as 263046 is registered |

**SPECIFIC OUTCOME** 1
Analyse the client brief.

**SPECIFIC OUTCOME** 2
Gather on-site information.

**SPECIFIC OUTCOME** 3
Apply principles of perception and visualization to represent interpretation of client requirements.

**SPECIFIC OUTCOME** 4
Analyse and apply data to the design.

**SPECIFIC OUTCOME** 5
Produce a free-hand drawing of the proposal.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

*Plan and schedule workflow*

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263064 | Plan and schedule workflow | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 3 |

*This unit standard replaces:*

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14474 | Plan and schedule workflow | Level 4 | 3 | Will occur as soon as 263064 is registered |

**SPECIFIC OUTCOME 1**
Obtain and evaluate data to facilitate drawing workflow process.

**SPECIFIC OUTCOME 2**
Demonstrate an understanding of the planning and scheduling of work processes.

**SPECIFIC OUTCOME 3**
Plan and schedule workflow according to organisational requirements.

**SPECIFIC OUTCOME 4**
Monitor the achievement of the workflow plan.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 66071 | Further Education and Training Certificate: Computer Aided Drawing (CAD) | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***QUALIFICATION:***
***Further Education and Training Certificate: Supervision of Construction Processes***

| *SAQA QUAL ID* | *QUALIFICATION TITLE* | | |
|---|---|---|---|
| 65949 | Further Education and Training Certificate: Supervision of Construction Processes | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *QUALIFICATION TYPE* | *FIELD* | *SUBFIELD* | |
| Further Ed and Training Cert | 12 - Physical Planning and Construction | Physical Planning, Design and Management | |
| *ABET BAND* | *MINIMUM CREDITS* | *NQF LEVEL* | *QUAL CLASS* |
| Undefined | 181 | Level 4 | Regular-Unit Stds Based |

***This qualification replaces:***

| Qual ID | Qualification Title | NQF Level | Min Credits | Replacement Status |
|---|---|---|---|---|
| 49053 | National Certificate: Supervision of Construction Processes | Level 4 | 176 | Will occur as soon as 65949 is registered |

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

Learners found competent against this Qualification will be able to execute the supervision of construction processes in a specific civil engineering context.

For those with extensive experience in the workplace, this Qualification can be used in the recognition of prior learning process to assess and recognise workplace skills acquired without the benefit of formal education and training.

For the new entrant, this Qualification describes the learning outcomes required to effectively participate in a structured workplace.

For education and training providers, this Qualification provides guidance for the development of appropriate learning programmes and assessment documentation.

For employers, this Qualification enables skills gaps to be identified and addressed ensuring that productivity levels are increased and business objectives achieved.

This Qualification has been developed to provide flexibility and mobility/portability across the construction industry. This will allow for future career advancement across the various learnerships in the supervision of construction processes.

Qualifying learners will be capable of:

> Applying occupational health, safety and environmental legislation and procedures in construction supervision.
> Applying information from contract documentation, drawings and specifications to set out a construction site and supervise construction activities.

> Supervising construction work teams and their activities.

Rationale:

This unit-standards based qualification has been generated to provide further education, training and development for learners who have successfully achieved the competencies to perform one or more of the various specialised functions involved in civil engineering construction (NQF Levels 2 and 3).

These specialised functions include sub-disciplines of building construction, road works, water and waste water, earthworks, labour intensive construction and other civil engineering construction contexts. This qualification will therefore serve to develop learners who have already acquired the necessary skills to perform civil engineering construction functions and wish to develop the required supervision skills. It may also serve learners who wish to enter the civil engineering construction industry at supervisory level and for those wishing to have their supervisory experience recognised via the process of recognition of prior learning.

While this NQF Level 4 qualification is intended to build upon previous learning, it is also intended to provide a foundation for further learning in civil engineering construction management. This Further Education and Training Certificate (FETC) in Construction Processes Supervision will serve to develop a professional pool of first line managers who perform supervisory functions in one or more civil engineering contexts. Typical job roles related to this qualification include foreman, supervisor, section manager and superintendent, depending on the type and size of the construction organisation. The qualification reflects the skills and knowledge required to be an effective supervisor in the Construction Industry in micro, small, medium or large operations.

The qualification consists of generic supervisory competencies, generic technical competencies, as well as "supervisory technical expertise" required in a specific context. The latter reflects the technical working knowledge and skills required to supervise a specific area of activity. The various areas of supervision are reflected in the elective component of the qualification.

The employability and career prospects of learners can therefore be enhanced by this qualification.

Previously disadvantaged individuals with this qualification can take a supervisory role in Industry: a process that will accelerate economic transformation and provide economic empowerment.

The benefits to the economy is that quality supervision in the Construction Industry will result in improved productivity, quality, safety and cost efficiency - thus improving service delivery of infrastructure.

***RECOGNIZE PREVIOUS LEARNING?***
Y

***LEARNING ASSUMED IN PLACE***
It is recommended that learners wishing to access this qualification will be competent in the following:

> Communication, NQF Level 3.
> Mathematical literacy, NQF Level 3.

Recognition of Prior Learning (RPL):

This qualification may be obtained in part or as a whole through the process of Recognition of Prior Learning (RPL). Learners who have met the requirements of any Unit Standard in this Qualification may apply for recognition of prior learning to the relevant Education and Training Quality Assurance Body (ETQA), and will be assessed against the assessment criteria and specific outcomes for the relevant Unit Standard/s.

Access to the Qualification:

> Access to this qualification is open, however, the learning assumptions listed below must be considered.

***QUALIFICATION RULES***
In order to be awarded the Qualification, the learner has to prove competence in the entire Fundamental and Core Unit Standards, as well as a minimum of 10 credits from the elective list.

> Fundamental: 56 Credits.
> Core: 115 Credits.
> Min. Electives: 10 Credits.

Minimum total: 181 Credits.

The minimum of 10 credits to achieve from the elective component should represent at least one of the following areas of civil engineering construction supervision:

> General Civil Engineering Construction.
> General Structures Construction.
> Concreting.
> Concrete Reinforcing.
> Access Scaffolding and formwork.
> Structural steel.
> Jacking.
> Piling.
> Road and rail formation.
> Earthworks.
> Drainage.
> Water and sanitation.
> Road works.
> Building construction.

***EXIT LEVEL OUTCOMES***
1. Apply occupational health, safety and environmental legislation and procedures in construction supervision.

2. Apply information from contract documentation, drawings and specifications to set out a construction site.

3. Supervise construction activities.

***ASSOCIATED ASSESSMENT CRITERIA***
Associated Assessment Criteria for Exit Level Outcome 1:

1.1 Health, safety and preventative measures for hazards are explained in relation to a construction site.
1.2 A health and safety site plan, systems and procedures are developed, implemented and monitored according to legislation, regulations, by-laws and organizational procedures.

1.3 Environmental management initiatives are implemented during the pre-construction, construction and post-construction phases of a project according to relevant legislation and organizational procedures.

Associated Assessment Criteria for Exit Level Outcome 2:

2.1 The scope, structure and scope of the construction industry is analysed in terms of its activities and impact on the South African economy.
2.2 The interface between drawings, specifications, the bill of quantities and general conditions of contract is explained in terms of the contract/project documentation.
2.3 Information from construction drawings and specifications are extracted and applied to set out a construction site and supervise construction activities.
2.4 Construction work areas are set out using measuring tape, spirit level and theodolite according to drawings and construction project requirements.

Associated Assessment Criteria for Exit Level Outcome 3:

3.1 The planning, implementation and monitoring of a project quality plan are supervised according to the criteria in the project quality plan and organizational procedures.
3.2 Construction teams are recruited and developed according to Human Resource procedures and policies and supervised according to organizational procedures.
3.3 Human, materials and equipment resources are calculated, coordinated and monitored in relation to a civil engineering construction project requirements.
3.4 The requisition, receipt, storage and use of construction materials are supervised according to safety requirements and specifications.
3.5 Team activity production outputs are measured, recorded and productivity improvement measures are implemented according to organizational procedures.

Integrated Assessment:

Integrated assessment at the level of the qualification provides an opportunity for learners to show that they are able to integrate concepts, principles and practice across unit standards to achieve competence that is grounded and coherent in relation to the purpose of the qualification. Integrated assessment should show how already demonstrated competence in individual areas can be linked and applied for the achievement of a holistic outcomes as described in the exit level outcomes.

Integrated assessment must judge the quality of the observable performance, and also the quality of the thinking that lies behind it. Assessment tools must encourage learners to give an account of the thinking and decision-making that underpin their demonstrated performance. Some assessment practices will demand practical evidence while others may be more theoretical, depending on the type of outcomes to be assessed. The ratio between action and knowledge is not fixed, but varies according to the demands of the particular exit level outcome of the qualification.

While the generic components of this qualification at NQF Level 4 can be assessed through occupational contexts and activities relating to Construction Processes, care must be taken in both the learning programme and the assessment to ensure that these foundational skills are portable. The primary aim of this qualification is to ensure that learners have a sound general foundation to prepare them for further learning towards a specialised role in their chosen career path. Learners must be able to transfer generic skills across a number of different contexts, and apply them within a number of learning areas.

A broad range of task-orientated and theoretical assessment tools may be used, with the distinction between practical knowledge and disciplinary knowledge maintained so that each takes its rightful place.

***INTERNATIONAL COMPARABILITY***

While the approach to education and training in construction supervision varies across many countries, the nature and extent of required competencies does compare favourably. The depth of study varies as is illustrated by the mode and duration or learning time. There are offering for full-time students and part-time students as well as on-line and distance learning. Courses include certificates, diplomas, associate degrees, awards and short courses/programmes.

Qualifications that offered a holistic approach for construction supervision from the following countries were evaluated as the approach and purpose compared closely:

> New Zealand.
> United Kingdom.
> United States of America.

No equivalent qualifications were found to be offered by African countries as illustrated by the searches conducted at the following Authorities:

> Technical, Entrepreneurial and Vocational Education and Training Authority (TEVETA) of Malawi.
> Vocational Education and Training Authority (VETA) of Zambia.
> Botswana Training Authority (BOTA) of Botswana.

New Zealand:

The National Certificate in Civil Construction Supervision (Level 4) for 188 credits compares closely with the South African equivalent FET Certificate in Construction Supervision as the level of complexity is the same; the purpose, duration of study and elective contexts are very similar. These industry sectors include Earthworks, Civil Plant Management, Road Construction and Road Maintenance.

The following detailed comparison between the outcomes of the qualification excludes the fundamental component of the South African qualification. The following core unit standards of the New Zealand qualification compares closely with this qualification:

> 6442: Supervise civil construction activities on a single site, Level 4 (10 credits).
> 6456: Organise the supply and storage of materials for civil construction, Level 3 (4 credits).
> 22294: Set out levels and positions in civil construction projects, Level 4 (10 credits).
> 6428: Demonstrate knowledge of engineering survey and set-out for civil construction work, Level 4 (20 credits).
> 6455: Supervise civil construction subcontractors, Level 4 (8 credits).
> 22992: Prepare and maintain records for civil construction works, Level 4 (10 credits).
> 22290: Demonstrate knowledge of quality assurance requirements on civil construction works, Level 3 (3 credits).

The competencies described in the following unit standards are not evident in the core of the South African qualification:

> 6436: Inspect civil construction plant and equipment, Level 4 (5 credits).
> 12568: Plan and supervise site drainage and dewatering work on civil construction sites, Level 4 (8 credits).
> 6434: Liaise with client, consultant, and service authority on behalf of civil construction contractor, Level 4 (12 credits).

United Kingdom:

The Level 3 NVQ in Construction Site Supervision (500/3765/1) represents an equivalence with the South African qualification in terms of purpose, level, duration and elective contexts. This qualification has been designed for those working in Construction Site Supervision.

To achieve the award candidates must follow one of five optional routes which cover Building and Civil Engineering; Highways Maintenance & Repair, Residential Development, Conservation or Demolition. The units for all five routes cover areas such as working relationships, implementation of health and safety systems, controlling quality, progress and cost, work methods and use of resources.

The following six mandatory units all compare with the South African qualification at the level of unit standards, specific outcomes or assessment criteria:

> R/104/0559 - Maintain Systems for Health, Safety, Welfare and Environmental Protection.
> J/104/0560 - Assess and Recommend Work Methods.
> L/104/0561 - Plan Work Activities and Resources to Meet Work Requirements.
> R/104/0562 - Co-ordinate Work Control.
> Y/104/0563 - Control Work Progress Against Agreed Programmes.
> D/104/0564 - Allocate and Monitor the Use of Plant, Equipment or Machinery.

The following mandatory units also correspond with some of the competencies described in the core and elective South African unit standards:

> T/103/1191 - Develop and Maintain Good Working Relationships.
> H/104/0565 - Maintain Supplies of Materials to Meet Project Requirements.
> K/104/0566 - Implement Communication Systems for the Project.
> M/104/0567 - Maintain the Dimensional Accuracy of the Work.
> T/104/0568 - Control Work Against Agreed Quality Standards.
> A/104/0569 - Contribute to Controlling Work Quantities and Costs.
> M/104/0570 - Co-ordinate Preparation for Site Operations.
> A/104/0507 - Allocate Work and Check People's Performance.

United States of America:

The construction supervision certificate offered by Cumberland County College, New Jersey prepares students for entry-level supervisory positions with all types of construction companies. These positions require a working knowledge in many areas including finance, marketing and sales, management, estimating, scheduling, cost control and monitoring safety programs. This program is designed to develop supervisors, not technicians.

The program requirements describe the achievement of 67 credits of which the following core component represents 45 credits. The following core components compare favourably with the South African qualification:

> CM107: Construction Contract Documents.
> CM114: Management of Field Operations.
> CM120: Construction Methods.
> CM121: Construction Drawings.
> CM128: Construction Materials.
> CM131: Construction Safety.
> CM206: Construction Estimating.
> CME: Construction Supervision Electives.

The competencies of the following unit titles are not catered for in the South African qualification:

> BU115: Introduction to Business.

> CS102: "M" Applications on the Microcomputer.
> CM137: Residential & Commercial Building Codes.
> CM111: Construction Office Management.

Conclusion:

It is evident from the forgoing comparison that the FET Certificate in Construction Supervision generated for the South African context compares closely with the above examples. The close similarity in the core component of the qualifications is detailed above. The approach to the electives is also similar with clusters of units that must be achieved for any one of the range of civil engineering contexts of the learner's choice.

***ARTICULATION OPTIONS***
Vertical articulation is possible with the following:

> ID 23675: National Certificate: Management of Construction Processes, NQF Level 5.
> ID 48636: National Diploma: Structural Steelwork Detailing, NQF Level 5.

Horizontal articulation is possible with the following:

> ID 48817: National Certificate: Construction Materials Testing, NQF Level 4.
> ID 66071: Further Education and Training Certificate: Computer Aided Drawing Office Practice, NQF Level 4.

***MODERATION OPTIONS***
> Anyone assessing a learner or moderating the assessment of a learner against the qualification must be registered as an assessor with the relevant Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding 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 Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding with the relevant ETQA.

> Assessment and moderation of assessment will be overseen by the relevant Education, Training, Quality, Assurance (ETQA) Body, or by an ETQA that has a Memorandum of Understanding with the relevant ETQA, according to the ETQA's policies and guidelines for assessment and moderation.

> Moderation must include both internal and external moderation of assessments, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described in the associated unit standards.

> 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***
N/A

***NOTES***
This qualification replaces qualification 49053, "National Certificate: Supervision of Construction Processes", Level 4, 176 credits.

***UNIT STANDARDS***

| ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|---|---|---|---|

| | ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|---|---|---|---|---|
| Fundamental | 119472 | Accommodate audience and context needs in oral/signed communication | Level 3 | 5 |
| Fundamental | 119457 | Interpret and use information from texts | Level 3 | 5 |
| Fundamental | 119467 | Use language and communication in occupational learning programmes | Level 3 | 5 |
| Fundamental | 119465 | Write/present/sign texts for a range of communicative contexts | Level 3 | 5 |
| Fundamental | 9015 | Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life related problems | Level 4 | 6 |
| Fundamental | 7484 | Describe, represent, analyse and explain changes in shape and motion in 2- and 3-dimensional space with justification | Level 4 | 4 |
| Fundamental | 119461 | Make and motivate judgements on selected literary texts | Level 4 | 5 |
| Fundamental | 119469 | Read/view, analyse and respond to a variety of texts | Level 4 | 5 |
| Fundamental | 119471 | Use language and communication in occupational learning programmes | Level 4 | 5 |
| Fundamental | 7468 | Use mathematics to investigate and monitor the financial aspects of personal, business, national and international issues | Level 4 | 6 |
| Fundamental | 119459 | Write/present/sign for a wide range of contexts | Level 4 | 5 |
| Core | 263267 | Analyse the nature and scope of the construction industry | Level 4 | 4 |
| Core | 263264 | Calculate construction quantities and develop a work plan | Level 4 | 8 |
| Core | 114218 | Demonstrate an understanding and implement environmental initiatives on a construction project | Level 4 | 6 |
| Core | 262826 | Implement a quality management system on a construction project | Level 4 | 16 |
| Core | 262844 | Monitor and control cost and productivity of a construction project | Level 4 | 12 |
| Core | 263265 | Perform site administration functions | Level 4 | 10 |
| Core | 116692 | Plan, organise and control the erection, alteration/repositioning and dismantling of access scaffolding | Level 4 | 12 |
| Core | 262864 | Read, interpret and use construction drawings and specifications | Level 4 | 10 |
| Core | 263266 | Set out construction work areas | Level 4 | 10 |
| Core | 262845 | Supervise construction teams | Level 4 | 5 |
| Core | 262884 | Supervise health and safety on a construction project | Level 4 | 4 |
| Core | 263284 | Supervise the use and storage of construction materials | Level 4 | 8 |
| Core | 15137 | Apply contract documentation | Level 5 | 10 |
| Elective | 262591 | Finish off steel structure and explain hand over procedures | Level 3 | 6 |
| Elective | 262592 | Guide the lifting and positioning of loads | Level 3 | 6 |
| Elective | 114977 | Use a spreadsheet package to produce and manage business documents | Level 3 | 3 |
| Elective | 116574 | Assess appearance, durability and strength of precast elements | Level 4 | 5 |
| Elective | 116571 | Carry out routine tests on raw materials for concrete production | Level 4 | 10 |
| Elective | 116680 | Conduct specialist sealing and repairs to concrete | Level 4 | 10 |
| Elective | 116572 | Control concrete material quality | Level 4 | 5 |
| Elective | 116591 | Demonstrate an understanding of and adjust concrete mix design | Level 4 | 5 |
| Elective | 116563 | Demonstrate knowledge and apply concrete materials technology | Level 4 | 10 |
| Elective | 15183 | Demonstrate knowledge of concrete construction technology | Level 4 | 10 |
| Elective | 15168 | Implement labour intensive construction systems and techniques | Level 4 | 12 |
| Elective | 116556 | Interpret and apply reinforcing drawings | Level 4 | 5 |
| Elective | 15172 | Interpret test/lab results in civil construction | Level 4 | 4 |
| Elective | 262587 | Interpret, read and use reinforcing drawings | Level 4 | 10 |
| Elective | 15180 | Organise and control the installation of jacked pipes | Level 4 | 8 |
| Elective | 15185 | Organise and control the spraying of bitumen on road surfaces | Level 4 | 5 |
| Elective | 15187 | Organize and control general road maintenance activities | Level 4 | 20 |
| Elective | 15189 | Organize and control road rehabilitation by milling | Level 4 | 4 |

| | ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|---|---|---|---|---|
| Elective | 15169 | Organize and control the construction of bulk earthworks | Level 4 | 12 |
| Elective | 15170 | Organize and control the utilization of plant and equipment in civil engineering construction | Level 4 | 12 |
| Elective | 116564 | Oversee concrete production | Level 4 | 5 |
| Elective | 116561 | Oversee instantly de-moulded pre cast concrete element production | Level 4 | 5 |
| Elective | 116558 | Oversee pre cast concrete production - wet mix | Level 4 | 5 |
| Elective | 116580 | Oversee spun pre cast concrete element production | Level 4 | 5 |
| Elective | 116583 | Perform tandem lifting | Level 4 | 12 |
| Elective | 116615 | Plan and prepare for the erection of structural steelwork | Level 4 | 16 |
| Elective | 15195 | Plan organize and control the installation of drainage structures for stormwater flow | Level 4 | 10 |
| Elective | 116686 | Plan, organise and control piling operations | Level 4 | 20 |
| Elective | 116689 | Plan, organise and control pre - cast concrete manufacturing processes | Level 4 | 10 |
| Elective | 15175 | Plan, organise and control the construction of stabilized and unstabilized pavement layers | Level 4 | 12 |
| Elective | 116691 | Plan, organise and control the erection, alteration/repositioning and dismantling of load bearing scaffolding | Level 4 | 12 |
| Elective | 116690 | Plan, organise and control the erection, alteration/repositioning and dismantling of suspended scaffolding | Level 4 | 18 |
| Elective | 116685 | Plan, organise and control the fabrication and erection of formwork | Level 4 | 20 |
| Elective | 15177 | Plan, organise and control the installation of Armco pipes | Level 4 | 8 |
| Elective | 15184 | Plan, organise and control the installation of pressure and gravity drainage pipes | Level 4 | 8 |
| Elective | 116688 | Plan, organise and control the jacking of concrete structures | Level 4 | 20 |
| Elective | 116683 | Plan, organise and control the maintanance of steel structures | Level 4 | 8 |
| Elective | 15186 | Plan, organise and control the maintenance of gravity drainage structures | Level 4 | 5 |
| Elective | 15188 | Plan, organise and control the maintenance of pressure pipelines | Level 4 | 8 |
| Elective | 116693 | Plan, organize and control reinforcing site activities | Level 4 | 25 |
| Elective | 116694 | Plan, organize and control reinforcing workshop activities | Level 4 | 20 |
| Elective | 116579 | Supervise the installation of precast concrete elements | Level 4 | 8 |
| Elective | 116581 | Supervise under water concreting | Level 4 | 4 |
| Elective | 116592 | Tension bonded tendons | Level 4 | 10 |
| Elective | 116593 | Tension unbonded tendons | Level 4 | 10 |
| Elective | 15165 | Use labour intensive construction methods to construct and maintain roads and stormwater drainage | Level 4 | 8 |
| Elective | 15159 | Use labour intensive construction methods to construct and maintain water and sanitation services | Level 4 | 8 |
| Elective | 15166 | Use labour intensive construction methods to construct, repair and maintain structures | Level 4 | 8 |
| Elective | 15161 | Initiate testing and interpret test/lab results in civil construction | Level 5 | 4 |
| Elective | 15181 | Organise and control a binder manufacturing process | Level 5 | 10 |
| Elective | 15178 | Organise and control a hot mix asphalt manufacturing process | Level 5 | 10 |
| Elective | 15190 | Plan, organise and control asphalt paving construction | Level 5 | 15 |
| Elective | 15192 | Plan, organise and control bituminous surfacing seal construction | Level 5 | 15 |

***LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION***
***None***

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Implement a quality management system on a construction project***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262826 | Implement a quality management system on a construction project | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 16 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14416 | Implement a quality management system, project quality plan and a quality improvement process on a construction project | Level 4 | 10 | Will occur as soon as 262826 is registered |
| 14418 | Monitor and control cost and production of construction work activities and implement productivity improvements | Level 4 | 12 | Will occur as soon as 262826 is registered |

**SPECIFIC OUTCOME** 1
Plan a quality management system on a construction project.

**SPECIFIC OUTCOME** 2
Implement a quality improvement process on a construction project.

**SPECIFIC OUTCOME** 3
Calculate production and resources costs.

**SPECIFIC OUTCOME** 4
Implement productivity improvement measures.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65949 | Further Education and Training Certificate: Construction Processes Supervision | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Monitor and control cost and productivity of a construction project***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262844 | Monitor and control cost and productivity of a construction project | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 12 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14418 | Monitor and control cost and production of construction work activities and implement productivity improvements | Level 4 | 12 | Will occur as soon as 262844 is registered |

**SPECIFIC OUTCOME** 1
Measure and record activity production and resource costs.

**SPECIFIC OUTCOME** 2
Compile a production and cost activity report.

**SPECIFIC OUTCOME** 3
Control cost of construction activity.

**SPECIFIC OUTCOME** 4
Implement productivity improvement measures.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65949 | Further Education and Training Certificate: Construction Processes Supervision | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Supervise construction teams***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262845 | Supervise construction teams | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 5 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14417 | Lead and supervise construction teams | Level 4 | 8 | Will occur as soon as 262845 is registered |

SPECIFIC OUTCOME 1
Identify labour requirements.

SPECIFIC OUTCOME 2
Recruit, select and induct team members.

SPECIFIC OUTCOME 3
Supervise work team and monitor performance.

SPECIFIC OUTCOME 4
Train, coach and develop team members.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65949 | Further Education and Training Certificate: Construction Processes Supervision | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Read, interpret and use construction drawings and specifications***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262864 | Read, interpret and use construction drawings and specifications | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 10 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14426 | Read, interpret and use construction drawings and specifications | Level 4 | 10 | Will occur as soon as 262864 is registered |

**SPECIFIC OUTCOME** 1
Analyse the purpose of drawings and specifications in a construction project.

**SPECIFIC OUTCOME** 2
Explain drawings and symbols used on a construction project.

**SPECIFIC OUTCOME** 3
Safeguard, store and issue construction drawings.

**SPECIFIC OUTCOME** 4
Apply information from drawings in construction activities.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65949 | Further Education and Training Certificate: Construction Processes Supervision | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Supervise health and safety on a construction project***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 262884 | Supervise health and safety on a construction project | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 4 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14429 | Supervise health and safety on a construction project | Level 4 | 6 | Will occur as soon as 262884 is registered |

SPECIFIC OUTCOME 1
Demonstrate an understanding of Health and Safety on a construction site.

SPECIFIC OUTCOME 2
Explain hazards in construction work areas and preventative measures.

SPECIFIC OUTCOME 3
Co-ordinate first aid resources in the case of an emergency.

SPECIFIC OUTCOME 4
Develop and implement a Health and Safety Site plan.

SPECIFIC OUTCOME 5
Monitor the implementation of the Health and Safety plan, systems and procedures.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65949 | Further Education and Training Certificate: Construction Processes Supervision | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Calculate construction quantities and develop a work plan***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263264 | Calculate construction quantities and develop a work plan | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14414 | Calculate construction quantities and develop a work plan | Level 4 | 8 | Will occur as soon as 263264 is registered |

**SPECIFIC OUTCOME** 1
Analyse project documentation to establish quantities.

**SPECIFIC OUTCOME** 2
Calculate the required material quantities.

**SPECIFIC OUTCOME** 3
Estimate the required human and equipment resources.

**SPECIFIC OUTCOME** 4
Prepare a work plan.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65949 | Further Education and Training Certificate: Construction Processes Supervision | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Perform site administration functions***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263265 | Perform site administration functions | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 10 |

***This unit standard is replaced by:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14425 | Perform site administration functions | Level 4 | 10 | Complete |

**SPECIFIC OUTCOME 1**
Maintain site records.

**SPECIFIC OUTCOME 2**
Implement personnel administration.

**SPECIFIC OUTCOME 3**
Implement reporting systems.

**SPECIFIC OUTCOME 4**
Measure and calculate quantities.

**SPECIFIC OUTCOME 5**
Attend meetings and provide feedback.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65949 | Further Education and Training Certificate: Construction Processes Supervision | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Set out construction work areas***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263266 | Set out construction work areas | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 10 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14428 | Set out construction work areas | Level 4 | 10 | Will occur as soon as 263266 is registered |
| 252060 | Set out construction work | Level 5 | 10 | Will occur as soon as 263266 is registered |

**SPECIFIC OUTCOME 1**
Understand surveying techniques and principles.

**SPECIFIC OUTCOME 2**
Set out works using measuring tapes and a spirit level.

**SPECIFIC OUTCOME 3**
Set out and check levels and profiles.

**SPECIFIC OUTCOME 4**
Set out work using a theodolite.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65949 | Further Education and Training Certificate: Construction Processes Supervision | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

*UNIT STANDARD:*

***Analyse the nature and scope of the construction industry***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263267 | Analyse the nature and scope of the construction industry | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 4 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14415 | Describe and interpret the composition, role-players, processes and role of the construction industry | Level 4 | 4 | Will occur as soon as 263267 is registered |
| 252061 | Explain the roles and functions of construction industry stakeholders, role-players and processes associated with the industry | Level 5 | 4 | Will occur as soon as 263267 is registered |

SPECIFIC OUTCOME 1
Analyse the nature and impact of the construction industry.

SPECIFIC OUTCOME 2
Analyse the structure of the construction industry.

SPECIFIC OUTCOME 3
Interpret the implications of legislation, regulations and code of practice.

SPECIFIC OUTCOME 4
Explain major construction activities.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65949 | Further Education and Training Certificate: Construction Processes Supervision | Level 4 |

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

***UNIT STANDARD:***

***Supervise the use and storage of construction materials***

| *SAQA US ID* | *UNIT STANDARD TITLE* | | |
|---|---|---|---|
| 263284 | Supervise the use and storage of construction materials | | |
| *ORIGINATOR* | | *PROVIDER* | |
| SGB Civil Engineering Construction | | | |
| *FIELD* | | *SUBFIELD* | |
| 12 - Physical Planning and Construction | | Physical Planning, Design and Management | |
| *ABET BAND* | *UNIT STANDARD TYPE* | *NQF LEVEL* | *CREDITS* |
| Undefined | Regular | Level 4 | 8 |

***This unit standard replaces:***

| US ID | Unit Standard Title | NQF Level | Credits | Replacement Status |
|---|---|---|---|---|
| 14430 | Supervise the procurement, use and storage of construction materials | Level 4 | 10 | Will occur as soon as 263284 is registered |

**SPECIFIC OUTCOME** 1
Requisition construction materials.

**SPECIFIC OUTCOME** 2
Receive and verify quantity and quality of construction materials.

**SPECIFIC OUTCOME** 3
Store construction materials.

**SPECIFIC OUTCOME** 4
Issue and reconcile construction materials.

**SPECIFIC OUTCOME** 5
Supervise the use of materials.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

| | ID | QUALIFICATION TITLE | LEVEL |
|---|---|---|---|
| Core | 65949 | Further Education and Training Certificate: Construction Processes Supervision | Level 4 |