No. 210 **22 February 2008**

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

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

Generic Manufacturing, Engineering and Technology

registered by Organising Field 06 – Manufacturing, Engineering and Technology, 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 Qualification and Unit Standards can be accessed via the SAQA web-site at **www.saqa.org.za**. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, 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 20 March 2008.*** All correspondence should be marked **Standards Setting – Generic Manufacturing, Engineering and Technology** and addressed to

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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
National Certificate: Mechanical Engineering: Fitting

SAQA QUAL ID	*QUALIFICATION TITLE*		
59669	National Certificate: Mechanical Engineering: Fitting		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering & Technolog			
QUALIFICATION TYPE	*FIELD*	*SUBFIELD*	
National Certificate	6 - Manufacturing, Engineering and Technology	Engineering and Related Design	
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
23274	National Certificate: Mechanical Engineering: Fitting	Level 3	133	Will occur as soon as 59669 is registered

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

The purpose of this qualification is to allow for the uptake of programme/s in mechanical fitting which are able to able to meet the various needs of industry. The structure of the qualification therefore gives greater access to learners within the principal mechanical engineering sectors by offering a broad range of specialisations (see qualification rules).

While this qualification is suited to those wishing to pursue a programme in the mechanical engineering industry as mechanical fitters, it also provides a means for recognition of current competency for those currently employed in mechanical engineering enterprises.

Typical entrants to this qualification could be:

- Learners who have completed the Level 2 qualification and who are engaged in a learning pathway towards the Further Education and Training Certificate (Level 4).
- People who have acquired engineering skills through workplace experience and who are able to achieve competency at the level of this qualification. (RPL candidates).

At this level, learners are able to accept responsibility for maintaining plant and/or equipment without working under direct supervision.

People credited with this qualification contribute to the maintenance of machinery and equipment by applying mechanical knowledge and skills.

They are able to:

- Understand and solve problems by communicating in verbal or written form with peers, members of supervisory/management levels and others.
- Understand and solve problems by applying mathematical practical applications.
- Understand machine technology and interpret detailed engineering drawings of machines.
- Remove and re-install machine sub-components (bearings, lubricators, direct and indirect drives), including the ability to repair, re-adjust, reset or re-align the sub-components.
- Maintain machinery and equipment (may include pumps, winches, compressors and drive-units).
- Evaluate and solve familiar problems pertaining to machine equipment and related processes.

Qualifying learners will be able to relate the tasks and processes to scientific and technological principles and concepts. They will also be able to maintain and support the various policies and procedures integral to safety, health and the environment. Learner achievements in this qualification will also serve as a basis for further learning to engage in more complex maintenance and repair activities and processes.

Rationale:

In practice, the fitters provide a wide range of engineering maintenance, repair and installation services and support across various industry sectors, namely:

- Manufacturing and Engineering (Metals, Plastics, Tyre and Rubber, Automotive Manufacturing).
- Chemical and Petrochemical.
- Mining.
- Transport (Maritime, Road, Rail and Aviation).
- Civil Engineering and Construction.
- Food and Beverages.
- Other engineering-related industry sectors.

The equipment requiring services and support ranges from sophisticated engineering systems, to all forms of industrial machinery (single and combined). Learners at NQF Level 3, performing mechanical installation, maintenance and repair work, require:

- Technical skills (analytical).
- Communication skills.
- Team skills.
- Technology orientation in a variety of contexts (mechanical, electrical and information management).

This is the second of three qualifications, forming part of a progression for learners who wish to obtain the Further Education and Training Certificate in Mechanical Engineering (Fitting). This qualification focuses on developing the skills, knowledge and values required to maintain and repair engineering machines and machine sub-assemblies and components.

The qualification also provides:

- Opportunities for further learning in the field of mechanical engineering.
- Recognition of prior learning (RPL) options for learners who have gained relevant experience in the workplace.

RECOGNIZE PREVIOUS LEARNING?
Y

LEARNING ASSUMED IN PLACE
The following competencies are assumed for a learner embarking on this qualification:

- Communication and Literacy, at NQF Level 2.
- Mathematical Literacy, at NQF Level 2.

In addition, learners are assumed to have the following skills at NQF Level 2 in the context of mechanical fitting.

- Use and apply fitting technology, processes and skills, applicable to mechanical installation, maintenance and repair, according to industry standards.
- Apply a variety of mechanical assembly techniques, according to basic mechanical engineering theory and the interpretation of engineering drawings.
- Maintain basic mechanical equipment according to industry standards, in terms of safety, health, quality and efficiency.

These skills form the basis for determining the credit allocation in this qualification and may be acquired through the National Certificate: Mechanical Engineering (Fitting) NQF Level 2. If a learner does not have such experience, the learning time will be increased. The allocation of credits is also based on the assumption that the learner will be working towards this qualification as part of a learning programme which integrates the unit standards.

Recognition of Prior Learning:

This qualification may be obtained through a process of RPL. The learner should be thoroughly briefed prior to the assessment and support should be provided to assist the learner in the process of developing a portfolio. The guidelines for integrated assessment should be used to develop the RPL assessment process. As with integrated assessment, while this is primarily a workplace-based qualification, evidence from other areas of endeavour may be introduced if pertinent to any of the Exit Level Outcomes.

Access to Qualification:

Access to this qualification is open. However, it is preferred that learners have completed a National Certificate in Mechanical Engineering (Fitting) NQF Level 2 or an equivalent qualification.

QUALIFICATION RULES

Fundamental Component:

The Fundamental Component consists of Unit Standards in:

- Communications at Level 3 to the value of 26 credits.
- Mathematical Literacy at Level 3 to the value of 11 credits.
- All Unit Standards in the Fundamental Component are compulsory.

Core Component:

The Core Component consists of Unit Standards to the value of 43 credits all of which are compulsory.

Elective Component:

The Elective Component consists of a number of specializations each with its own set of Unit Standards. Learners are to choose a specialization area and must choose Elective Unit Standards to the value of 40 credits from the Elective Unit standards listed under that specialization so as to attain a minimum of 120 credits for this qualification.

Specialisation Area 1:

Fitting (Manufacturing, Engineering and Related Industries).

Learners must Elective Unit Standards from the list below to give a minimum of 40 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

- Elective; ID 13298; Produce detailed engineering drawings; Level 3; 6 Credits.
- Elective; ID 253475; Maintain conveyor systems; Level 3; 6 Credits.
- Elective; ID 13325; Maintain gearboxes; Level 4; 10 Credits.
- Elective; ID 13282; Maintain brakes and clutches; Level 3; 6 Credits.
- Elective; ID 253391; Maintain centrifugal pumps; Level 3; 14 Credits.
- Elective; ID 253497; Maintain positive displacement pumps; Level 3; 10 Credits.
- Elective; ID 253439; Maintain valves; Level 2; 8 Credits.

Total: 60 Credits.

Specialisation area 2:

Fitting (Chemical Industry).

Learners must do Unit Standard ID 244077 and must choose additional Elective Unit Standards from the list below to give a minimum of 40 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

- Elective; ID 244077; Demonstrate understanding of chemicals in a processing environment; Level 2; 6 Credits.
- Elective; ID 253491; Maintain centrifugal pumps; Level 3; 14 Credits.
- Elective; ID 253497; Maintain positive displacement pumps; Level 3; 10 Credits.
- Elective; ID 253439; Maintain valves; Level 2; 8 Credits.
- Elective; ID 253423; Maintain motorised valves; Level 3; 4 Credits.
- Elective; ID 253434; Maintain heat exchangers and pressure vessels; Level 3; 6 Credits.
- Elective; ID 13303; Align machines and equipment using laser technology; Level 4; 6 Credits.

Total: 48 Credits

Specialisation area 3:

Fitting (Mining Industry).

Learners must Elective Unit Standards from the list below to give a minimum of 40 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

- Elective; ID 253391; Maintain centrifugal pumps; Level 3; 14 Credits.
- Elective; ID 253497; Maintain positive displacement pumps; Level 3; 10 Credits.
- Elective; ID 253439; Maintain valves; Level 2; 8 Credits.
- Elective; ID 253380; Repair self propelled mobile machines; Level 3; 5 Credits.
- Elective; ID 253359; Repair shuttle cars; Level 2; 5 Credits.
- Elective; ID 253396; Repair a vacuum pump; Level 3; 3 Credits.
- Elective; ID 253441; Repair crushers; Level 2; 4 Credits.

- Elective; ID 253432; Replace components on a dragline; Level 3; 8 Credits.
- Elective; ID 253419; Replace components on a stage loader; Level 2; 3 Credits.
- Elective; ID 253379; Repair mechanised coal mining equipment; Level 3; 9 Credits.
- Elective; ID 253358; Repair material separator or classifying equipment; Level 2; 2 Credits.
- Elective; ID 253390; Replace the girth gear and pinion on a mill; Level 3; 4 Credits.
- Elective; ID 253383; Maintain glass lined equipment; Level 3; 5 Credits.
- Elective; ID 253418; Repair a rotary packer; Level 3; 2 Credits.
- Elective; ID 253382; Maintain filter presses; Level 3; 4 Credits.
- Elective; ID 253395; Repair jig washers; Level 2; 4 Credits.
- Elective; ID 253417; Repair rotary kilns; Level 3; 7 Credits.
- Elective; ID 253422; Repair boom type stackers; Level 2; 3 Credits.
- Elective; ID 253874; Repair rail tracks; Level 2; 2 Credits.
- Elective; ID 253433; Repair bag palletisers; Level 2; 4 Credits.
- Elective; ID 253385; Repair bag-applicator machines; Level 2; 5 Credits.
- Elective; ID 253438; Repair an electro filter; Level 2; 2 Credits.
- Elective; ID 253354; Repair a grate cooler; Level 2; 3 Credits.
- Elective; ID 253356; Inspect a safety detaching hook; Level 2; 2 Credits.

Total: 116 Credits.

Specialisation area 4:

Fitting (Electrical Power Generation).

Learners must do Unit Standard ID 10893 and must choose additional Elective Unit Standards from the list below to give a minimum of 40 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

- Elective; ID 10893; Demonstrate knowledge and understanding of electrical power generation; Level 3; 5 Credits.
- Elective; ID 253391; Maintain centrifugal pumps; Level 3; 14 Credits.
- Elective; ID 253497; Maintain positive displacement pumps; Level 3; 10 Credits.
- Elective; ID 253439; Maintain valves; Level 2; 8 Credits.
- Elective; ID 242976; Operate overhead/gantry cranes; Level 2; 5 Credits.
- Elective; ID 253475; Maintain conveyor systems; Level 3; 6 Credits.
- Elective; ID 13303; Align machines and equipment using laser technology; Level 4; 6 Credits.
- Elective; ID 253423; Maintain motorised valves; Level 3; 4 Credits.

Total: 58 Credits.

EXIT LEVEL OUTCOMES

1. Demonstrate the skills and ability to remove and replace a variety of machine sub-components and assemblies.
- Range: Machine sub-components include bearings, lubricators, direct and indirect drives, etc.
- Range: Where applicable, close-tolerance adjustments include, but are not limited to repair, re-adjustment, re-setting and re-alignment.

2. Maintain machines and lubrication systems.
- Range: Machinery and equipment include, but are not limited to pumps, winches, compressors and drive-units (gear-boxes).
- Range: Lubrication systems include gravity-feed, immersion and force-feed types.

3. Solve familiar mechanical problems during the maintenance of machinery and equipment.

• Range: Machinery and equipment include, but are not limited to pumps, winches, compressors, and drive-units (gear-boxes).
• Range: Familiar problems related to machine equipment and related processes include, but are not limited to wear, minor malfunction, overheating and disruption in lubrication supply.

4. Communicate with peers, production personnel and supervisors/management.
• Range: Maintaining effective relationships.
• Range: Verbal and written reporting.
• Range: Exploring options for further learning.

Critical Cross-Field Outcomes:

These are embedded in the unit standards, which make up the qualification and are thus also reflected in the Exit Level Outcomes of the qualification.

The critical cross-field outcomes are supported by the exit level outcomes as follows:

Identifying and solving problems in which responses display that responsible decisions using critical thinking have been made:

• Related to the maintenance of machinery, components and engineering systems.
• Solving problems during the removal, replacement, readjust and/or realignment engineering components and sub-assemblies.

Working effectively with others as a member of a team, group, organization and community:

• All tasks and work-related experience are performed within a team environment.
• Taking into account, the safety of others.
• Communicating with production, quality control and supervisory personnel and/or clients.

Organising and managing oneself and one's activities responsibly and effectively:

• Related to planning and preparation for maintenance activities.
• Developing best practice behaviour in work performance and adhering to standard operating procedures.
• Focussing on housekeeping, safe practices and care and storage of tools and equipment.

Collecting, analyzing, organizing and critically evaluating information:

• Related to supervision of job activities.
• Completion of technical reports related to the job activity
• Solve familiar problems during the execution of fitting tasks.

Communicating effectively using visual, mathematical and/or language skills:

• During supervision and the execution of job activities.
• Execution of commands and completion of technical reports related to the job activity.
• Communicating as a part of a team.

Using science and technology effectively and critically, showing responsibility toward the environment and health of others:

• Application of science and technology during the maintenance of machinery and engineering systems.
• Relating to the safety of others and paying attention to environmental issues.

- Solving problems and applying science and technology to the job activity.

Demonstrate an understanding of the world as a set of related systems by recognizing that problem contexts do not exist in isolation:

- Integrating the task with the plant installation's or engineering system's functionality.
- Solving problems through the integration of various sources of information.
- Demonstrating and understanding of related systems through the use of general and specific channels of communication when dealing with peers, production, quality control and supervisory personnel and/or clients.

ASSOCIATED ASSESSMENT CRITERIA

Associated Assessment Criteria for Exit Level Outcome 1:

1.1 Machine sub-components are removed, replaced and maintained to required standards by demonstrating knowledge, skills and the appropriate use of tools and equipment.
1.2 Disassembly, assembly and installation procedures are performed in terms of the correct worksite procedures and adherence to manufacturers' specifications.
1.3 Working practices are adhered to in terms of safety and legislative requirements.
1.4 Lubrication systems are explained and correct maintenance procedures are demonstrated according to prescribed procedures.

Associated Assessment Criteria for Exit Level Outcome 2:

2.1 An understanding of routine mechanical maintenance and lubrication procedures and operations is demonstrated according to plant procedures and manufacturers' specifications.
2.2 Engineering drawings are read, interpreted and produced in the engineering context.
2.3 The impact of mechanical maintenance and lubrication activities are demonstrated in terms of their effect on and contribution to the efficient operation of plant and equipment by demonstrating theory and principles as they are applied in an engineering context.

Associated Assessment Criteria for Exit Level Outcome 3:

3.1 Fault-finding of mechanical equipment and machinery is done in relation to the overall condition.
3.2 Various options are explained and solutions are considered before an appropriate solution is chosen in relation to the maintenance history.
3.3 Problems are timeously and accurately reported to relevant personnel by explaining the malfunction and the potential solution, using accepted industry terminology.
3.4 Routine problems on various machines and related components are explained as they are encountered in operational circumstances by displaying personal decision-making and responsibility.

Associated Assessment Criteria for Exit Level Outcome 4:

4.1 Verbal communication is used in the interaction with other role players in the maintenance process to determine and understand the extent of maintenance problems, find and implement solutions and giving and getting feedback.
4.2 Written communication is used in order to understand, evaluate and report on maintenance problems.
4.3 Technical reading and writing skills are applied in order to understand engineering and related information.
4.4 Learning options and preparation requirements for further learning are explained in terms of the NQF and lifelong learning.

Integrated Assessment:

• Assessment practices must be open transparent fair valid and reliable and should ensure that no learner is disadvantaged in any way whatsoever, so that an integrated approach to assessment is incorporated into the qualification.
• Learning teaching and assessment are inextricably interwoven. Whenever possible the assessment knowledge skills attitudes and values shown in the unit standards should be integrated.
• Assessment of Communication and Mathematical Literacy should be integrated as far as possible with other aspects and should use practical administration 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 or will work. 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 a range of summative assessment methods and assess combinations of practical, applied, foundational and reflective competencies.
• Assessors must assess and give credit for the evidence of learning that has already been acquired and could include formal, non-formal learning and work experience.
• Assessment should ensure that all specific outcomes, embedded knowledge and critical cross-field outcomes are evaluated in an integrated manner.
• Integrated assessment instruments may combine practical and theoretical components of assessment with the following unit standards in relation to the exit level outcomes:

Exit Level Outcomes and Associated Unit Standards:

Demonstrate the skills and ability to remove and replace a variety of machine sub-components and assemblies, making adjustments and meeting output requirements according to work instructions and safe work practices.

Category; SAQA ID; Title; Level; Credits:

• Core; ID 13223; Apply safety, health and environmental protection procedures; Level 3; 6 Credits.
• Core; ID 13283; Maintain bearings in machines and equipment; Level 3; 8 Credits.
• Core; ID 13216; Maintain indirect drives; Level 2; 6 Credits.
• Core; ID 13280; Maintain direct drives; Level 3; 6 Credits.
• Core; ID 116714; Lead a team, plan, allocate and assess their work; Level 3; 4 Credits.
• Fundamental; ID 9013; Describe, apply, analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts; Level 3; 4 Credits.
• Fundamental; ID 119457; Interpret and use information from texts; Level 3; 5 Credits.

Maintain machines and lubrication systems in terms of plant/system safety and efficiency.

Category; SAQA ID; Title; Level; Credits:

• Core; ID 13277; Maintain lubricating systems; Level 3; 4 Credits.
• Core; ID 13283; Maintain bearings in machines and equipment; Level 3; 8 Credits.
• Core; ID 13216; Maintain indirect drives; Level 2; 6 Credits.
• Core; ID 116714; Lead a team, plan, allocate and assess their work; Level 3; 4 Credits.
• Core; ID 13280; Maintain direct drives; Level 3; 6 Credits.
• Core; ID 9530; Manage work time effectively; Level 3; 3 Credits.

Solve familiar mechanical problems during the maintenance of machinery and equipment and operate within clearly defined contexts according to work instructions and manufacturers' specifications.

Category; SAQA ID; Title; Level; Credits:

- Core; ID 13277; Maintain lubricating systems; Level 3; 4 Credits.
- Core; ID 13283; Maintain bearings in machines and equipment; Level 3; 8 Credits.
- Core; ID 13216; Maintain indirect drives; Level 2; 6 Credits.
- Core; ID 13280; Maintain direct drives; Level 3; 6 Credits.
- Core; ID 116714; Lead a team, plan, allocate and assess their work; Level 3; 4 Credits.
- Fundamental; ID 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 Credits.

Communicate with peers, production personnel and supervisors/management, according to industry standards.

Category; SAQA ID; Title; Level; Credits:

- Core; ID 12456 ; Explain and use organisational procedures; Level 3; 6 Credits.
- Core; ID 116714; Lead a team, plan, allocate and assess their work; Level 3; 4 Credits.
- Fundamental; ID 119472; Accommodate audience and context needs in oral/signed communication; Level 3; 5 Credits.
- Fundamental; ID 9528; Communicate with clients; Level 3; 3 Credits.
- Fundamental; ID 12488; Complete feasibility and commissioning reports; Level 3; 3 Credits.
- Fundamental; ID 9012; Investigate life and work related problems using data and probabilities; Level 3; 5 Credits.
- Fundamental; ID 119465; Write/present/sign texts for a range of communicative contexts; Level 3; 5 Credits.

INTERNATIONAL COMPARABILITY

In benchmarking the reviewed Mechanical Engineering (Fitting) qualifications against international qualifications, examples in different parts of the world were found.

New Zealand (www.kiwiquals.govt.nz) in terms of the New Zealand Qualifications Framework (NZQF):

Qualifications investigated:

- National Certificate in Engineering (General Engineering-Mechanical) (Level 3) - Competenz (Training Provider).
- National Certificate in Mechanical Engineering (Level 3)-Competenz (Training Provider).

Australia (www.ntis.gov.au) in terms of the Australian Quality Training Framework (AQTF):

The following information was obtained on the website: http://www.ntis.au (National Information Training System) with regards to qualifications in mechanical engineering training streams in Australia:

"Australian Apprenticeships" is the new name for the scheme formerly known as 'New Apprenticeships'.

Australian Apprenticeships encompass all apprenticeships and traineeships. They combine time at work with training and can be full-time, part-time or school-based.

The qualifications investigated for mechanical fitters cover:

- Certificate III Engineering - Mechanical Trade.

- Certificate III in Gas Fitting.
- Certificate III in Mine Mechanical Engineering.
- Certificate III in Aeroskills (Aircraft Mechanical) (Replaced by MEA20401).

United Kingdom (England and Scotland) - from www.ecitb.org.uk

The qualification from the National and Scottish Vocational Qualifications (N/SVQ) which relates to standards-based programme is the N/SVQ Maintaining Plant and Systems - Mechanical with multiple strands covering a broad spectrum of trade fields.

This programme is the closest programme related to the Mechanical Fitter L2 - 4. It comprises:

- Maintaining Plant & Systems Mechanical N/SVQ - Mandatory Units.
- Maintaining Plant & Systems Mechanical N/SVQ - Technical Options Set A.
- Maintaining Plant & Systems Mechanical N/SVQ - Technical Options Set B.

Conclusion:

The NC Mechanical Engineering (Fitting) L3 compares well to the qualifications found in New Zealand, Australia and the United Kingdom.

African Comparability:

Southern African Development Community (SADC) - Zimbabwe and Botswana::

Alignment with the United Kingdom's model of Vocational Education and Training (VET), through the London City and Guilds qualification framework and the National Vocational Qualification system (NVQ) - The Botswana National Qualifications Act was passed in 1998. At this present time, focus on the development of standards-based qualifications through a Botswana Vocation Education and Training System (BVET) has revolved around the Wholesale and Retail and Tourism sectors.

Currently, mechanical fitters in Botswana are trained through the apprenticeship system. The length and duration of the practical and theoretical components differ slightly to the South African apprenticeship system, but the learning competencies are similar, with a focus on the predominant diamond mining and small local manufacturing and engineering industries.

East African Community (EAC):

The three member states of the EAC; Kenya, Tanzania and Uganda, are in the process of the harmonisation of education and training systems within the EAC. Currently, no qualification infrastructure exists.

Canada:

Information regarding training was also found on the website of the British Columbia Institute of Technology (www.bcit.ca), the College of The Rockies (www.cotr.bc.ca) and North Alberta Institute of Technology (www.nait.ca). The full mechanical fitter qualification is obtained over a four-year period. The "job description" of the mechanical fitter is in essence similar in the international arena.
Mechanical fitters install, repair, overhaul and maintain all types of machinery and heavy mechanical equipment".

Conclusion:

The Canadian qualifications related to mechanical fitting can be used interchangeably with the qualifications developed for the South African manufacturing and engineering industries, serving a similar purpose.

United States

In the United States model, the mechanical fitter qualification is achieved over a four-year period and is similar to the traditional apprenticeship system in South Africa. The methodology is competency-based as opposed to outcomes-based.

The programme content however, is similar to the broad context of Mechanical Engineering (Fitting) Levels 2, 3 and 4.

Conclusion:

The reviewed mechanical fitter qualification L3 is in line with the US example for year 2/3 of the apprenticeship programme.

Summary of comparisons with NC Mechanical Engineering (Fitting) Level 3:

• Content: The qualifications from the various countries all address the range of mechanical competencies included in Level 3, thus attending to the need to fulfil the requirements of being introductory by nature.
• Progression: The international qualifications all address a progression of competencies, e.g. demonstration of the ability to maintain and repair machine sub-assemblies and drives (Level 3), albeit in a single apprenticeship of about 4 years.

The content of the second/third year of a typical mechanical fitting programme in most countries, relates favourably to the content of Mechanical Engineering (Fitting) Level 3 and Learning Assumed to be in Place:

• Demonstration of work practices:
○ Investigation into international comparability produces overarching similarities in the outcomes of the various mechanical fitter (maintenance or production) training programmes in all the countries above. They are:

Level 3 outcomes common to most countries:

• Apply mechanical knowledge and skills in order to assist maintenance and/or production teams
• Maintain and repair production or processing machines and equipment with minimal downtime.
• Participate in the maintenance/production of machinery for delivery to client/s.
• Check, set up and operate various types of machines and drives.
• Report any information that may impede the operation of the plant as soon as it becomes known.
• Conclusion: These outcomes are covered within the Level 3 certificate developed for South Africa.

• Learning delivery: The learning delivery process in all the examples included on-the-job (practical) and off-the-job (theoretical) components.

• Outcomes-Based: All the examples found either directly or indirectly comply with principles of outcomes-based learning, particularly in terms of outcomes representing meaningful units of learning and assessment being conducted continuously (formatively). There is generally a final

integrated assessment, typically called a trade test, where the candidate is required to demonstrate specific and core (cross-field) knowledge and skills.

• Apprenticeships and VET programmes: In all the examples found, learning is vocational-based. In some countries (England, Scotland, New Zealand and Australia) these are called "modern apprenticeships". These take the form of two categories, namely a programme-led apprenticeship where learners are able to follow a vocational programme at a college and then seek employment as trainees/apprentice/interns in order to qualify as artisans; and an employer-led apprenticeship, in which learners are engaged in a formal contract of learning and most learning is workplace-based. In most cases learners "earn while they learn".

• Application (Purpose): As is the intention with the South African qualifications, the international qualifications all prepare learners for working in process or manufacturing oriented industries where they contribute to the effective and efficient maintenance of plant and equipment.

Concluding remarks:

The Level 3 certificate developed for South Africa compares favourably with the international qualifications mentioned above.

ARTICULATION OPTIONS

The qualification was designed to enable qualifying learners to move from one engineering context to another and still get recognition for successful learning achievements in the previous context. This means that credit accumulation towards certification could be obtained across industries.

Vertical articulation:

National Certificate: Mechanical Engineering (Fitting) NQF Level 3.

Horizontal Articulation:

Fundamental learning at this level applies to equivalent credit accrual for engineering-related qualifications at NQF Level 3.

Core learning at this level applies to equivalent credit accrual for some unit standards in most trade-related qualifications, eg:

• ID: 58720; National Certificate: Engineering Fabrication NQF Level 3.
• ID: 23255; National Certificate: Mechanical Engineering (Fitting and Machining) NQF Level 3.
• ID: 57886; National Certificate: Welding Application and Practice NQF Level 3.

Other horizontal articulation options may exist and need further investigation in cases where recognition of prior learning is sought.

MODERATION OPTIONS

• Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered with an appropriate Education and Training Quality Assurance Body (ETQA) or with an ETQA which has a Memorandum of Understanding (MOU) with the relevant ETQA.

• Any institution offering learning that will enable the achievement of this qualification must be accredited as a Training Provider with the relevant ETQA or with an ETQA that has a Memorandum of Understanding (MOU) with the relevant ETQA.

• Moderation of assessment will be overseen by the relevant ETQA or by an ETQA that has a Memorandum of Understanding (MOU) with the relevant ETQA according to that ETQA's guidelines for assessment and moderation.

• Moderation includes both internal and external moderation of assessment/s at the 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 in exit level outcomes described in this Qualification.

CRITERIA FOR THE REGISTRATION OF ASSESSORS
The following criteria should be applied by a relevant ETQA as a minimum requirement:

Assessors should be in possession of an appropriate qualification, namely:

• Mechanical Engineering (Fitting) at NQF Level 4 and a minimum period of related experience as specified by the relevant ETQA.
• An artisan qualification in Mechanical Fitting (Trade test certificate or completed contract of apprenticeship) with a minimum period of related experience as specified by the relevant ETQA.
• Subject matter experience, which may be established through recognition of prior learning (RPL).

Registration as an assessor with the relevant Education and Training Quality Assurance Body.

Proven inter-personal skills and the ability to:

• Maintain national and local industry standards.
• Act in the interest of the learner.
• Understand the need for transformation to redress the legacies of the past.
• Respect the cultural background and language of the learner.

NOTES
This qualification replaces qualification 24273, "National Certificate: Mechanical Engineering: Fitting", Level 3, 133 credits.

This reviewed qualification is the result of an inter-SETA collaborative process and therefore replaces the following qualifications:

• SAQA ID 23274; National Certificate: Mechanical Engineering (Fitting) NQF Level 3.
• SAQA ID 13672; National Certificate: Chemical Fitter (Interim-registered) NQF Level 3.

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	119472	Accommodate audience and context needs in oral/signed communication	Level 3	5
Fundamental	9528	Communicate with clients	Level 3	3
Fundamental	12488	Complete feasibility and commissioning reports	Level 3	3
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	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

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Core	13216	Maintain indirect drives	Level 2	6
Core	13223	Apply safety, health and environmental protection procedures	Level 3	6
Core	12456	Explain and use organisational procedures	Level 3	6
Core	116714	Lead a team, plan, allocate and assess their work	Level 3	4
Core	13283	Maintain bearings in machines and equipment	Level 3	8
Core	13280	Maintain direct drives	Level 3	6
Core	13277	Maintain lubricating systems	Level 3	4
Core	9530	Manage work time effectively	Level 3	3
Elective	244077	Demonstrate understanding of chemicals in a processing environment	Level 2	6
Elective	253356	Inspect a safety detaching hook	Level 2	2
Elective	242981	Operate defined purpose lift trucks	Level 2	4
Elective	242976	Operate overhead/gantry cranes	Level 2	5
Elective	253354	Repair a grate cooler	Level 2	3
Elective	253433	Repair bag palletisers	Level 2	4
Elective	253385	Repair bag-applicator machines	Level 2	5
Elective	253422	Repair boom type stackers	Level 2	3
Elective	253441	Repair crushers	Level 2	4
Elective	253395	Repair jig washers	Level 2	4
Elective	253358	Repair material separating/classifying equipment	Level 2	2
Elective	253874	Repair rail tracks	Level 2	2
Elective	253359	Repair shuttle cars	Level 2	5
Elective	253419	Replace components on a stage loader	Level 2	3
Elective	243063	Weld carbon steel work-pieces using the shielded metal arc welding process in the down-hand position.	Level 2	15
Elective	10893	Demonstrate knowledge and understanding of electrical power generation	Level 3	5
Elective	13282	Maintain brakes and clutches	Level 3	6
Elective	253391	Maintain centrifugal pumps	Level 3	14
Elective	253494	Maintain compressors	Level 3	15
Elective	253475	Maintain conveyor systems	Level 3	6
Elective	253382	Maintain filter presses	Level 3	4
Elective	253430	Maintain filters and strainers	Level 3	4
Elective	253383	Maintain glass lined equipment	Level 3	5
Elective	253434	Maintain heat exchangers and pressure vessels	Level 3	8
Elective	253423	Maintain motorised valves	Level 3	4
Elective	253497	Maintain positive displacement pumps	Level 3	10
Elective	253439	Maintain valves	Level 3	8
Elective	9526	Manage basic business finance	Level 3	6
Elective	13298	Produce detailed engineering drawings	Level 3	6
Elective	253418	Repair a rotary packer	Level 3	2
Elective	253396	Repair a vacuum pump	Level 3	3
Elective	253438	Repair an electro filter	Level 3	4
Elective	253379	Repair mechanised coal mining equipment	Level 3	9
Elective	253397	Repair rotary kilns	Level 3	7
Elective	253380	Repair self-propelled mobile machines	Level 3	5
Elective	253432	Replace components on a dragline	Level 3	8
Elective	253390	Replace the girth gear and pinion on a mill	Level 3	4
Elective	13303	Align machines and equipment using laser technology	Level 4	6
Elective	13325	Maintain gearboxes	Level 4	10

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
National Certificate: Mechanical Engineering: Fitting

SAQA QUAL ID	*QUALIFICATION TITLE*		
59689	National Certificate: Mechanical Engineering: Fitting		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering & Technolog			
QUALIFICATION TYPE	*FIELD*	*SUBFIELD*	
National Certificate	6 - Manufacturing, Engineering and Technology	Engineering and Related Design	
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUAL CLASS*
Undefined	130	Level 2	Regular-Unit Stds Based

This qualification replaces:

Qual ID	Qualification Title	NQF Level	Min Credits	Replacement Status
23273	National Certificate: Mechanical Engineering: Fitting	Level 2	138	Will occur as soon as 59689 is registered

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

The purpose of this qualification is to build the knowledge and skills required by employees in all types of engineering environments (in various sectors of the economy) that would add value to the qualifying learner in terms of enrichment of the person, status and recognition.

This qualification forms a structured and formal learning path, resulting in outcomes which are assessed and recognized in terms of the relevant national structures such as ETQAs and the NQF.

Typical entrants to this qualification could be:

- People currently working in industry who have acquired some engineering skills and have the potential to complete this qualification successfully.
- People working in industry from fields other than engineering who have the interest and potential to complete this qualification successfully.
- School leavers who have not yet had any work experience or vocational learning, but who have the potential to achieve this qualification.

Qualifying learners at NQF Level 2 will be able to perform trade-related skills, with specific reference to:

- Use engineering tools, measuring instruments and fitting technology.
- Read, interpret and produce basic engineering drawings.
- Apply hand skills applicable to mechanical installation and maintenance.
- Understand and apply basic mechanical assembly techniques.

• Understand basic mechanical theory and the application in relation to the maintenance and function of machines and engineering systems.

Qualified learners will also understand:

• Their role in the business, i.e. in engineering and related activities.
• How they are affected by legislation, regulations, agreements and policies related to their particular work environment.

Learner achievements in this qualification could also serve as a basis for further learning where they will engage in installation, maintenance and repair activities.

Rationale:

In practice, skilled fitter-artisans provide maintenance and repair services to factories, processing plant and other industrial operations, ensuring that production efficiencies are consistently maintained.

This occupational qualification serves the need of the society and the economy by providing engineering support services in the manufacture and maintenance of machinery, plant and engineering systems in industries such as:

• Manufacturing and Engineering (Metals, Plastics, Tyre and Rubber, Electrical Power Generation, Automotive Manufacturing).
• Chemical and Petrochemical.
• Mining.
• Transport (Maritime, Road, Rail and Aviation).
• Civil Engineering and Construction.
• Food and Beverages.
• Other engineering-related industry sectors.

These industries are vital to the existence, performance and growth of the South African economy. A healthy economy is in turn vital in terms of the development of its people.

Companies invest considerable sums of money in plant, machinery, equipment, processes, raw materials and other resources. These investments can only be justified if the plant, machinery and equipment operate to the optimum capacity and efficiency. Stoppages and breakdowns need to be kept to the absolute minimum, as such stoppages lead to undue increases in costs. The effective maintenance and repair of plant, machinery and equipment is thus of utmost importance. Competent (qualified) engineering practitioners (engineers, technicians, artisans and supporting staff) are required for this purpose.

Through its design, this qualification will meet the needs of learners within the mechanical engineering sector who require technical expertise and essential knowledge needed to earn a formal qualification relevant to mechanical fitting.

This qualification facilitates access from previously disadvantaged groups and other learners to acquire the technical knowledge and skills that are required.

The National Certificate Mechanical Engineering (Fitting) Level 2 will produce competent learners who are able to contribute to improved productivity and efficiency within the sector. They will be able to work according to Occupational Health and Safety requirements, while maintaining the relevant quality standards, which are particularly important in the engineering sector.

This qualification will enhance the status, productivity and employability of the learner within the engineering sector as well as contribute to quality, production rate and growth. This allows for access, progression, portability and mobility within and between the different sectors to which the engineering sector provides maintenance services.

People who achieve this qualification may be employed in the following key positions, namely:

- Engineering assistants.
- Component assemblers.
- Storekeepers.
- Sales trainees.

Learners may advance from these positions to achieve the Level 3 qualification in the following specialisations:

- Mechanical Engineering (Fitting) NQF Level 3.
- Mechanical Engineering (Pipe-Fitting) NQF Level 3.
- Fluid Power Fitting NQF Level 3.

The qualification also provides opportunities for further learning in the field of Mechanical Engineering and recognition of prior learning.

RECOGNIZE PREVIOUS LEARNING?
Y

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

- Communication and Mathematical Literacy at NQF Level 1.
- Basic concepts of Science and Technology.

Recognition of Prior Learning:

This qualification can be obtained wholly or in part through the recognition of prior learning (RPL). The learner should be thoroughly briefed on the process. Support and guidance should be provided. The process should not be so onerous as to prevent learners from taking up the RPL option in obtaining the qualification.

Access to Qualification:

Access to this qualification is open. However, it is preferred that learners have completed a National Certificate at NQF Level 1 in a trade-related sub-field or an equivalent qualification.

QUALIFICATION RULES
Fundamental Component:

The Fundamental Component consists of Unit Standards in:

- Communications at Level 2 to the value of 20 credits.
- Mathematical Literacy at Level 2 to the value of 16 credits.
- All Unit Standards in the Fundamental Component are compulsory.

Core Component:

The Core Component consists of Unit Standards to the value of 62 credits all of which are compulsory.

Elective Component:

The Elective Component consists of a number of specializations each with its own set of Unit Standards. Learners are to choose a specialization area and must choose Elective Unit Standards to the value of 32 credits from the Elective Unit standards listed under that specialization so as to attain a minimum of 130 credits for this qualification.

Specialisation Area 1:

Learning Programme:

Fitting (Manufacturing, Engineering and Related Industries).

Learners must choose Elective Unit Standards from the list below to give a minimum of 32 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

- Elective; ID 13221; Perform routine maintenance; Level 2; 8 Credits.
- Elective; ID 12481; Sling loads; Level 2; 4 Credits.
- Elective; ID 13297; Grind tools and drill bits; Level 3; 4 Credits.
- Elective; ID 13214; Operate and monitor a drilling machine to produce simple components; Level 2; 6 Credits.
- Elective; ID 12465; Develop a learning plan and a portfolio for assessment; Level 2; 6 Credits.
- Elective; ID 12484; Perform basic fire fighting; Level 2; 4 Credits.
- Elective; ID 12483; Perform basic first aid; Level 2; 4 Credits.
- Elective; ID 12463; Understand and deal with HIV-Aids; Level 2; 4 Credits.
- Elective; ID 243067; Cut materials using the oxy-fuel gas cutting process (manual cutting) ; Level 2; 6 Credits.

Total: 46 Credits.

Specialisation area 2:

Learning Programme:

(Fitting) Chemical Industry.

Learners must do Unit Standard ID 253374 and must choose additional Elective Unit Standards from the list below to give a minimum of 32 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

- Elective; ID 253374; Describe the chemical industry, its regulatory requirements and communication techniques; Level 2; 4 Credits.
- Elective; ID 13297; Grind tools and drill bits; Level 3; 4 Credits.
- Elective; ID 13214; Operate and monitor a drilling machine to produce simple components; Level 2; 6 Credits.
- Elective; ID 13221; Perform routine maintenance; Level 2; 8 Credits.
- Elective; ID 12481; Sling loads; Level 2; 4 Credits.
- Elective; ID 12484; Perform basic fire fighting; Level 2; 4 Credits.
- Elective; ID 12483; Perform basic first aid; Level 2; 4 Credits.

• Elective; ID 12463; Understand and deal with HIV-Aids; Level 2; 4 Credits.
• Elective; ID 243067; Cut materials using the oxy-fuel gas cutting process (manual cutting) ; Level 2; 6 Credits.
• Elective, ID 243075 Draw and interpret simple plate, pipe and structural steel drawings. Level 2; 6 credits.

Total: 50 Credits.

Specialisation area 3:

Learning Programme:

Pipe-Fitting (Chemical Industry).

Learners must do Unit Standards ID 253374 and 253495 and must choose additional Elective Unit Standards from the list below to give a minimum of 32 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

• Elective; ID 13297; Grind tools and drill bits; Level 3; 4 Credits.
• Elective; ID 13214; Operate and monitor a drilling machine to produce simple components; Level 2; 6 Credits.
• Elective; ID 253374; Describe the chemical industry, its regulatory requirements and communication techniques; Level 2; 4 Credits.
• Elective; ID 12481; Sling loads; Level 2; 4 Credits.
• Elective; ID 12484; Perform basic fire fighting; Level 2; 4 Credits.
• Elective; ID 12483; Perform basic first aid; Level 2; 4 Credits.
• Elective; ID 243075; Draw and Interpret simple plate, pipe and structural steel drawings; Level 2; 6 Credits.
• Elective; ID 243063 ; Weld carbon steel work-pieces using the shielded metal arc welding process in the down-hand position; Level 2; 15 Credits.
• Elective; ID 243067; Cut materials using the oxy-fuel gas cutting process (manual cutting); Level 2; 6 Credits.
• Elective; ID 253474; Install Pipe Hangers and Supports; Level 2; 4 Credits.
• Elective; ID 253495; Use and select pipe systems and pipe components; Level 2; 4 Credits.
• Elective; ID 253496; Cut screw threads and install threaded pipe systems; Level 2; 4 Credits.
• Elective; ID 1084; Bend a pipe by means of a hydraulic pipe bender; Level 2; 4 Credits.

Total: 69 Credits.

Specialisation area 4:

Learning Programme:

Fitting (Fluid Power).

Learners must do Unit Standards ID 244690; ID 244691; ID 244686; ID 13136 and ID 244688. Additional Elective Unit Standards must be chosen from the list below in order to give a minimum of 32 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

• Elective; ID 13297; Grind tools and drill bits; Level 3; 4 Credits.
• Elective; ID 13214; Operate and monitor a drilling machine to produce simple components; Level 2; 6 Credits.

• Elective; ID 116938; Use a Graphical User Interface (GUI)-based word processor to create and edit documents; Level 1; 4 Credits.
• Elective; ID 243069; Braze metals using the oxy-fuel brazing process; Level 2; 6 Credits.
• Elective; ID 13217; Collect and use information; Level 2; 5 Credits.
• Elective; ID 12218; Construct and test basic electronic circuits; Level 2; 16 Credits.
• Elective; ID 117924; Use a Graphical User Interface (GUI)-based word processor to format documents; Level 2; 5 Credits.
• Elective; ID 244690; Demonstrate basic knowledge of hydraulic components; Level 2; 3 Credits.
• Elective; ID 244691; Demonstrate basic knowledge of pneumatic components; Level 2; 3 Credits.
• Elective; ID 244686; Demonstrate understanding of the principles of fluid power; Level 2; 6 Credits.
• Elective; ID 244688; Identify hose and fluid power connectors; Level 2; 3 Credits.
• Elective; ID 13136; Install, test, maintain and commission basic electrical circuits; Level 2; 16 Credits.
• Elective; ID 9322; Work in a team; Level 2; 3 Credits.
• Elective; ID 119753; Perform basic welding/joining of metals; Level 2; 8 Credits.
• Elective; ID 12465; Develop a learning plan and a portfolio for assessment; Level 2; 6 Credits.
• Elective; ID 9268; Manage basic personal finance; Level 2; 6 Credits.
• Elective; ID 12484; Perform basic fire fighting; Level 2; 4 Credits.
• Elective; ID 12483; Perform basic first aid; Level 2; 4 Credits.
• Elective; ID 12463; Understand and deal with HIV/AIDS; 3 Credits.

Total: 111 Credits.

Specialisation area 5:

Learning Programme:

Fitting (Mining Industry).

Learners must choose Elective Unit Standards from the list below to give a minimum of 32 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

• Elective; ID 13297; Grind tools and drill bits; Level 3; 4 Credits.
• Elective; ID 13214; Operate and monitor a drilling machine to produce simple components; Level 2; 6 Credits.
• Elective; ID 243784; Demonstrate an understanding of the South African mining and mineral sector processes; Level 1; 5 Credits.
• Elective; ID 13221; Perform routine maintenance; Level 2; 8 Credits.
• Elective; ID 12481; Sling loads; Level 2; 4 Credits.
• Elective; ID 12484; Perform basic fire fighting; Level 2; 4 Credits.
• Elective; ID 12483; Perform basic first aid; Level 2; 4 Credits.
• Elective; ID 12463; Understand and deal with HIV-Aids; Level 2; 4 Credits.
• Elective; ID 243067; Cut materials using the oxy-fuel gas cutting process (manual cutting) ; Level 2; 6 Credits.
• Elective; ID 253496; Cut screw threads and install threaded pipe systems; Level 2; 4 Credits.
• Elective; ID 253497; Maintain positive displacement pumps; Level 3; 10 Credits.
• Elective; ID 253391; Maintain centrifugal pumps; Level 3; 14 Credits.
• Elective; ID 253392; Maintain a conveyor belt installation; Level 2; 6 Credits.
• Elective; ID 253416; Replace mechanical components on a vibrating screen; Level 2; 4 Credits.

- Elective; ID 253394; Repair double drum scraper winches; Level 2; 6 Credits.
- Elective; ID 10741; Replace an inline ventilation fan in an underground environment; Level 2; 2 Credits.
- Elective; ID 253380; Repair self propelled mobile machines; Level 3; 5 Credits.
- Elective; ID 253435; Repair underground locomotives; Level 2; 8 Credits.
- Elective; ID ; Repair a drum stacker; Level 2; 5 Credits.
- Elective; ID 253425; Repair internal combustion engines; Level 2; 5 Credits.
- Elective; ID 253534; Repair an air driven track bound mechanical loaders; Level 2; 4 Credits.
- Elective; ID 253535; Repair mono rope winches; Level 2; 3 Credits.
- Elective; ID 253365; Replace components on a chairlift installation; Level 2; 4 Credits.
- Elective; ID 253514; Repair a rotary drill; Level 2; 4 Credits.
- Elective; ID 253441; Repair crushers; Level 2; 4 Credits.
- Elective; ID 253444; Repair a rope or hydraulic shovel; Level 2; 4 Credits.
- Elective; ID 253437; Repair mechanical rock breakers; Level 2; 4 Credits.
- Elective; ID 253432; Replace components on a dragline; Level 3; 8 Credits.
- Elective; ID ; Replace components on track driven earth moving equipment; Level 2; 4 Credits.
- Elective; ID 253362; Replace the screw of a screw type feeder; Level 2; 2 Credits.
- Elective; ID 253424; Repair a belt or chain type bucket elevator; Level 2; 4 Credits.
- Elective; ID 253454; Repair blow tanks; Level 3; 2 Credits.
- Elective; ID 253420; Repair a haul truck; Level 3; 5 Credits.
- Elective; ID 253414; Repair screw type conveyors; Level 2; 3 Credits.
- Elective; ID 253431; Replace a magnetic separator; Level 2; 2 Credits.
- Elective; ID 253426; Replace a hammer mill; Level 2; 2 Credits.
- Elective; ID 253354; Repair a grate cooler; Level 2; 3 Credits.
- Elective; ID 253445; Repair an air slide; Level 2; 3 Credits.
- Elective; ID 253436; Replace a pneumatic drill on a clay gun; Level 2; 2 Credits.
- Elective; ID 253428; Replace components on an apron feeder; Level 2; 2 Credits.
- Elective; ID 253387; Repair a bag-type dust suppression system; Level 2; 2 Credits.
- Elective; ID 253355; Repair a dredge; Level 3; 4 Credits.
- Elective; ID 253360; Replace a mould wheel assembly on a pig cast machine strand; Level 2; 2 Credits.
- Elective; ID 253364; Replace a rotary valve on a bag house; Level 2; 2 Credits.
- Elective; ID 253421; Make up a spare strand section for a pig cast machine; Level 2; 2 Credits.
- Elective; ID 253446; Overhaul pneumatic percussion drills; Level 2; 4 Credits.
- Elective; ID 253537; Overhaul the bogey of rolling stock; Level 2; 2 Credits.
- Elective; ID 9678; Follow basic health and safety practices underground; Level 2; 5 Credits.

Total: 206 Credits.

Specialisation area 6:

Learning Programme:

Fitting (Electrical Power Generation).

Learners must do Unit Standard ID 9839 and must choose additional Elective Unit Standards from the list below to give a minimum of 32 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

- Elective; ID 13297; Grind tools and drill bits; Level 3; 4 Credits.
- Elective; ID 13214; Operate and monitor a drilling machine to produce simple components; Level 2; 6 Credits.
- Elective; ID 9839; Apply and maintain safety in an electrical environment; Level 1; 5 Credits.

- Elective; ID 12481; Sling loads; Level 2; 4 Credits.
- Elective; ID 12465; Develop a learning plan and a portfolio for assessment; Level 2; 6 Credits.
- Elective; ID 12484; Perform basic fire fighting; Level 2; 4 Credits.
- Elective; ID 12483; Perform basic first aid; Level 2; 4 Credits.
- Elective; ID 12463; Understand and deal with HIV-Aids; Level 2; 4 Credits.
- Elective; ID 243067; Cut materials using the oxy-fuel gas cutting process (manual cutting) ; Level 2; 6 Credits.
- Elective; ID 253469; Cut screw threads and install threaded pipe systems; Level 2; 4 Credits.

Total: 37 Credits.

EXIT LEVEL OUTCOMES

1. Apply fitting technology, processes and skills, applicable to mechanical installation, maintenance and repair.

2. Apply a variety of assembly methods and techniques.

3. Maintain basic mechanical, pipe and fluid power equipment.

4. Demonstrate communication skills applicable to the workplace.

Critical Cross-Field Outcomes:

These are embedded in the unit standards, which make up the qualification and are thus also reflected in the Exit Level Outcomes of the qualification.

The critical cross-field outcomes are supported by the exit level outcomes as follows:

Identifying and solving problems in which responses display that responsible decisions using critical thinking have been made:

- Related to the application of mechanical technology and skills.
- In preparation and during the execution of job activities.
- Solving familiar maintenance problems.

Working effectively with others as a member of a team, group, organization and community:

- All tasks and work-related experience are performed within a team environment.
- Taking into account, the safety of others.
- Communicating with production, quality control and supervisory personnel and/or clients.

Organising and managing oneself and one's activities responsibly and effectively:

- Related to planning and preparation of fitting tasks.

Collecting, analyzing, organizing and critically evaluating information:

- Related to planning and preparation in order to execute job activities.
- Completion of technical reports related to the job activity.
- Solve familiar problems related to maintenance tasks at hand.

Communicating effectively using visual, mathematical and/or language skills:

- During planning, preparation and the execution of job activities Completion of technical reports related to the job activity.

- Communicating effectively by verbal explanation.
- Communicating as a part of a team.

ASSOCIATED ASSESSMENT CRITERIA

Associated Assessment Criteria for Exit Level Outcome 1:

1.1 Mechanical technology, techniques and processes applicable to mechanical fitting, pipe-fitting and fluid power are explained and demonstrated by the effective use of tools (hand and power tools), measuring instruments and engineering materials.
1.2 Occupational health, safety and environmental legislation issues are explained and safety practices and procedures are applied in terms of the general safety regulations and preventative measures, as prescribed by the OHS Act.
1.3 Machinery, tools and equipment are cleaned and stored according to standard operating procedures by following the correct procedures after completing the working task.
- Range: Tools and equipment include hand, power, marking-off and fastening tools and measuring equipment.
- Range: Technology and processes may include the use of various machines and equipment for drilling, tapping, reaming, filing, grinding and cutting.

Associated Assessment Criteria for Exit Level Outcome 2:

2.1 Dismantling and assembly processes and techniques are explained and applied in accordance with worksite practice and occupational health, thus ensuring that the appropriate tools and equipment are used and the proper sequence of work is followed.
- Range: Assembly techniques and processes include the use of tools and equipment for mechanical fitting, pipe-fitting and fluid power equipment.

2.2 Fitting skills are demonstrated according to precision dimensions.
2.3 The dismantling and assembly task is completed according to engineering drawings, work instructions and/or circuit diagrams.
- Range: Application of fasteners (nuts, bolts, washers, screws, etc).
- Range: Use of fastening devices (spanners, allen-keys, sockets, air-wrench etc).
- Range: Maintain static seals in equipment.
- Range: Assembly techniques, including part labelling, identification, sequencing, electrical isolation procedures and quality assurance procedures, as well as the application of reference drawings and specialised tools.
- Range: Dismantling and assembly may include mechanical, pipe and/or fluid power equipment.
- Range: The learning pathway for Fluid Power Fitting includes basic electrical circuits.

Associated Assessment Criteria for Exit Level Outcome 3:

3.1 Mechanical, pipe and fluid power components are maintained to manufacturers' requirements and the ability to recognise and respond to equipment/component requirements is demonstrated, resulting in increased levels of quality, efficiency and safety.
3.2 Adjustments made are appropriate in terms of operational and manufacturers' specifications.
3.3 Appropriate workplace procedures are applied in handling materials and components to avoid damage.
3.4 Quality, safety and environmental procedures are followed in terms of worksite procedures and relevant legislative requirements.

Associated Assessment Criteria for Exit Level Outcome 4:

4.1 The role of the learner in the business is described in terms of achieving specific objectives.
4.2 Communication skills are demonstrated in various work-related situations.
4.3 Relationships with peers are maintained to promote effective communication within the workplace.

4.4 Reports are produced for record keeping purposes.
4.5 Learning opportunities are identified and discussed for career development purposes.

Integrated Assessment:

• Assessment practices must be open transparent fair valid and reliable and should ensure that no learner is disadvantaged in any way whatsoever, so that an integrated approach to assessment is incorporated into the qualification.
• Learning teaching and assessment are inextricably interwoven. Whenever possible the assessment knowledge skills attitudes and values shown in the unit standards should be integrated.
• Assessment of Communication and Mathematical Literacy should be integrated as far as possible with other aspects and should use practical administration 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 or will work. 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 a range of summative assessment methods and assess combinations of practical, applied, foundational and reflective competencies.
• Assessors must assess and give credit for the evidence of learning that has already been acquired and could include formal, non-formal learning and work experience.
• Assessment should ensure that all specific outcomes, embedded knowledge and critical cross-field outcomes are evaluated in an integrated manner.
• Integrated assessment instruments may combine practical and theoretical components of assessment with the following unit standards in relation to the exit level outcomes:

Exit Level Outcomes and Associated Unit Standards:

The following exit level outcomes and associated unit standards include Core and Fundamental components of learning. Further integrated learning and assessment may be implemented by including Elective unit standards from the grouping of specialised learning pathways as indicated in the "Qualification Rules".

Use and apply fitting technology, processes and skills, applicable to mechanical installation, maintenance and repair, according to industry standards:

• Core; ID 12477 ; Identify engineering materials, their characteristics and applications and common metal tests used in engineering; Level 2; 4 Credits.
• Core; ID 12215; Read, interpret and produce basic engineering drawings; Level 2; 6 Credits.
• Core; ID 12216; Select, use and care for engineering hand tools; Level 2; 8 Credits.
• Core; ID 12476; Select, use and care for engineering measuring equipment; Level 2; 4 Credits.
• Core; ID 9881; Mark off basic regular engineering shapes; Level 2; 6 Credits.
• Core; ID 12219; Select, use and care for engineering power tools; Level 2; 6 Credits.
• Fundamental; ID 12444; Measure, estimate and calculate physical quantities and explore, describe and represent geometrical relationships in 2-dimensions in different life or workplace contexts; Level 2; 3 Credits.

Apply a variety of mechanical assembly techniques, according to basic mechanical engineering theory and the interpretation of engineering drawings:

• Core; ID (A. AMEND); Assemble mechanical components; Level 2; 12 Credits.
• Core; ID 13219; Maintain static seals in machines and/or equipment; Level 2; 4 Credits.
• Fundamental; ID 119463; Access and use information from texts; Level 2; 5 Credits.

• Fundamental; ID 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 Credits.
• Fundamental; ID 7480; Demonstrate understanding of rational and irrational numbers and number systems; Level 2; 3 Credits.
• Fundamental; ID 119460; Use language and communication in occupational learning programmes; Level 2; 5 Credits.

Maintain basic mechanical equipment according to industry standards, in terms of safety, health, quality and efficiency:

• Core; ID 12466; Explain the individual's role within business; Level 2; 4 Credits.
• Core; ID 13220; Keep the work area safe and productive; Level 2; 8 Credits.
• Fundamental; ID 119454; Maintain and adapt oral/signed communication; Level 2; 5 Credits.
• Fundamental; ID 7469; Use mathematics to investigate and monitor the financial aspects of personal and community life; Level 2; 2 Credits.
• Fundamental; ID 9007; Work with a range of patterns and functions and solve problems; Level 2; 5 Credits.
• Fundamental; ID 119456; Write/present for a defined context; Level 2; 5 Credits.

Demonstrate communication skills applicable to the workplace:

• Core; ID 12466; Explain the individual's role within business; Level 2; 4 Credits.
• Core; ID 13220; Keep the work area safe and productive; Level 2; 8 Credits.
• Fundamental; ID 119454; Maintain and adapt oral/signed communication; Level 2; 5 Credits.
• Fundamental; ID 9007; Work with a range of patterns and functions and solve problems; Level 2; 5 Credits.
• Fundamental; ID 119456; Write/present for a defined context; Level 2; 5 Credits.

INTERNATIONAL COMPARABILITY
This qualification - "National Certificate: Mechanical Engineering (Fitting)" does not use the traditional occupational terms "mechanical fitter", "maintenance fitter" or similar occupation titles, used in South Africa and most other countries.

The National Certificate: Mechanical Engineering (Fitting) Level 2 is the first of a learning path of three consecutive qualifications which culminate in the Further Education and Training Certificate: Mechanical Engineering (Fitting) Level 4. The international qualifications found, do not lead to three different qualifications, but culminate in one qualification over a four-year period (in most cases).

It is only in the vocational context, that we find the tendency to "break up" the traditional trades into levels of learning. This practice is endemic of those countries which have a close association with outcomes-based methodology and standards-based qualifications development.

The mechanical fitting qualifications (Level 2, Level 3 and Level 4 respectively) collectively compare well to similar apprenticeship and vocational education and training (VET) international qualifications.

This proposed qualification (Level 2) forms the foundation for a wide variety of mechanical fitting variants, namely:

• Maintenance Fitting.
• Mechanical Pipe-Fitting.
• Fluid Power Fitting - (Hydraulic/Pneumatic Fitting).
• Pump Fitting.
• Turbine Fitting and other specialised sub-fields associated with Fitting.

In benchmarking the Mechanical Engineering (Fitting) qualification Level 2, against international qualifications, examples in different parts of the world were investigated for their generic fitting content (excluding specialised sub-fields):

New Zealand (www.kiwiquals.govt.nz) in terms of the New Zealand Qualifications Framework (NZQF):

- National Certificate in Engineering (General Engineering-Mechanical) (Level 2) - Competenz (Training Provider).
- National Certificate in Mechanical Engineering (Level 2)-Competenz (Training Provider).

Australia (www.ntis.gov.au) in terms of the Australian Quality Training Framework (AQTF):

The following information was obtained on the website: http://www.ntis.au (National Information Training System) with regards to qualifications in mechanical engineering training streams in Australia.
"Australian Apprenticeships" is the new name for the scheme formerly known as 'New Apprenticeships'.

Australian Apprenticeships encompass all apprenticeships and traineeships. They combine time at work with training and can be full-time, part-time or school-based.

The change of name and appearance is the first step in a range of improvements to be introduced in Australian Apprenticeships.

The qualifications for mechanical fitters cover:

- Certificate I and II Engineering - Mechanical Trade.
- Certificate II in Gas Fitting.
- Certificate II in Mine Mechanical Engineering.
- Certificate II in Aeroskills (Aircraft Mechanical).

United Kingdom (England and Scotland) from www.ecitb.org.uk:

The qualification from the National and Scottish Vocational Qualifications (N/SVQ) which relates to standards-based programme is the N/SVQ Maintaining Plant and Systems-Mechanical. This programme is the closest programme related to the Mechanical Fitter Level 2-4. It comprises:

- Maintaining Plant and Systems Mechanical N/SVQ-Mandatory Units.
- Maintaining Plant and Systems Mechanical N/SVQ-Technical Options Set A.
- Maintaining Plant and Systems Mechanical N/SVQ-Technical Options Set B.

African Comparability:

Southern African Development Community (SADC)-Zimbabwe and Botswana:

Alignment with the United Kingdom's model of Vocational Education and Training (VET), through the London City and Guilds qualification framework and the National Vocational Qualification system (NVQ)-The Botswana National Qualifications Act was passed in 1998. At this present time, focus on the development of standards-based qualifications through a Botswana Vocation Education and Training System (BVET) has revolved around the Wholesale and Retail and Tourism sectors.

Currently, mechanical fitters in Botswana are trained through the apprenticeship system. The length and duration of the practical and theoretical components differ slightly to the South

African apprenticeship system, but the learning competencies are similar, with a focus on the predominant diamond mining and small local manufacturing and engineering industries.

East African Community (EAC):

The three member states of the EAC; Kenya, Tanzania and Uganda, are in the process of the harmonisation of education and training systems within the EAC. Currently, no qualification infrastructure exists.

Canada:

Information regarding training was also found on the website of the British Columbia Institute of Technology (www.bcit.ca), the College of The Rockies (www.cotr.bc.ca) and North Alberta Institute of Technology (www.nait.ca). The full mechanical fitter qualification is obtained over a four-year period. The "job description" of the mechanical fitter is in essence similar in the international arena.

Mechanical fitters install, repair, overhaul and maintain all types of machinery and heavy mechanical equipment".

Conclusion: The Canadian qualifications related to mechanical fitting can be used interchangeably with the qualifications developed for the South African manufacturing and engineering industries, serving a similar purpose.

United States:

In the United States model, the mechanical fitter qualification is achieved over a four-year period and is similar to the traditional apprenticeship system in South Africa. The methodology is competency-based as opposed to outcomes-based.

The programme content however, is similar to the broad context of Mechanical Engineering (Fitting) Levels 2, 3 and 4.

Conclusion: The reviewed mechanical fitter qualification L2 is in line with the US example for year 1/2 of the apprenticeship programme.

• This type of work requires many different skills. Mechanical fitters need to understand how machines work, be able to follow drawings and blueprints, use precision assembly equipment, and calculate angles and measurement.

• They also need to know how to use power tools, cutting torches and demonstrate the ability to weld using a variety of welding processes.

Comparisons with NC Mechanical Engineering (Fitting) Level 2:

The NC Mechanical Engineering (Fitting) Level 2 compares well to all the qualifications investigated with an overarching comparison covering:

• Content: The qualifications from the various countries all address the range of mechanical competencies included in Level 2, thus attending to the need to fulfil the requirements of being introductory by nature.

• Progression: The international qualifications all address a progression of competencies, e.g. Introduction to mechanical engineering technology and process and the demonstration of the ability to assemble, remove and replace components and (Level 2).

The content of the first/second year/level of the mechanical fitting qualifications across the globe, relates favourably to the content of Mechanical Engineering (Fitting) Level 2 and the learning assumed to be in place:

Demonstrate Work Practices:

- Basic training and skills in mechanical engineering technology processes and application of those skills to problems or demonstrate industrial electronic ability.
- Practice safe work habits.
- Apply that mechanical knowledge and skills and assist maintenance and/or production teams.
- Explain federal/provincial/state/territory's occupational health and safety regulations.
- Explain environmental regulations.
- Use personal protective equipment.
- Maintain safe working area.
- Describe fire prevention and control.
- Identify ergonomic considerations.
- Use communication and team skills.
- Interpret plans and sketches.
- Use references resources.
- Describe trade science.
- Use trade math.
- Describe principles of metallurgy.
- Use fasteners.
- Use hand tools.
- Use measuring and layout tools and instruments.
- Use power tools.
- Use fixed shop machines and equipment.
- Use mobile equipment.

Conclusion: These outcomes are covered within the L2 certificate developed for South Africa.

- Learning delivery: The learning delivery process in all the examples included on-the-job (practical) and off-the-job (theoretical) components.

- Outcomes-Based: All the examples found either directly or indirectly comply with principles of outcomes-based learning, particularly in terms of outcomes representing meaningful units of learning and assessment being conducted continuously (formatively). There is generally a final integrated assessment, typically called a trade test, where the candidate is required to demonstrate specific and core (cross-field) knowledge and skills.

- Apprenticeships and VET programmes: In all the examples found, learning is vocational-based. In some countries (England, Scotland, New Zealand and Australia) these are called "modern apprenticeships". These take the form of two categories, namely a programme-led apprenticeship where learners are able to follow a vocational programme at a college and then seek employment as trainees/apprentice/interns in order to qualify as artisans; and an employer-led apprenticeship, in which learners are engaged in a formal contract of learning and most learning is workplace-based. In most cases learners "earn while they learn".

- Application (Purpose): As is the intention with the South African qualifications, the international qualifications all prepare learners for working in process or manufacturing oriented industries where they contribute to the effective and efficient maintenance/ production of plant and equipment.

- Status: In all countries researched, engineering apprenticeship numbers have declined thus making "mechanical fitters" sought after individuals and their skills highly rated.

Concluding remarks:

The outcomes of the NC Mechanical Engineering (Fitting) Level 2 certificate developed for South Africa compares favourably with the rest of the international community and by every indication, is compatible with those countries who engage with outcomes-and standards-based qualifications.

ARTICULATION OPTIONS

The qualification was designed to enable qualifying learners to move from one engineering context to another and still get recognition for successful learning achievements in the previous context. This means that credit accumulation towards certification could be obtained across industries.

Vertical articulation:

- National Certificate: Mechanical Engineering (Fitting) NQF Level 3.
- National Certificate: Mechanical Engineering (Pipe-Fitting) NQF Level 3.
- National Certificate: Fluid Power Fitting NQF Level 3.

Horizontal Articulation:

Fundamental learning at this level applies to equivalent credit accrual for engineering-related qualifications at NQF Level 2.

Core learning at this level applies to equivalent credit accrual for some unit standards in the following qualifications:

- ID: 22422) National Certificate: Engineering and Related Design NQF Level 2.
- ID: 21108; National Certificate: Introductory Mechanical Engineering NQF Level 2.
- ID: 58722; National Certificate: Engineering Fabrication NQF Level 2.
- ID: 23254; National Certificate: Mechanical Engineering (Fitting and Machining) NQF Level 2.
- ID: 57881; National Certificate: Welding Application and Practice NQF Level 2.

Other horizontal articulation options may exist and need further investigation in cases where recognition of prior learning is sought.

MODERATION OPTIONS

- Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered with an appropriate Education and Training Quality Assurance Body (ETQA) or with an ETQA which has a Memorandum of Understanding (MOU) with the relevant ETQA.

- Any institution offering learning that will enable the achievement of this qualification must be accredited as a Training Provider with the relevant ETQA or with an ETQA that has a Memorandum of Understanding (MOU) with the relevant ETQA.

- Moderation of assessment will be overseen by the relevant ETQA or by an ETQA that has a Memorandum of Understanding (MOU) with the relevant ETQA according to that ETQA's guidelines for assessment and moderation.

- Moderation-includes both internal and external moderation of assessment/s at the 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 in exit level outcomes described in this Qualification.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

The following criteria should be applied by a relevant ETQA as a minimum requirement:

Assessors should be in possession of an appropriate qualification, namely:

- Mechanical Engineering (Fitting); Pipe-Fitting or Fluid Power Fitting at NQF level 4 and a minimum period of related experience as specified by the relevant ETQA.
- An artisan qualification in Mechanical Fitting (Trade test certificate or completed contract of apprenticeship) with a minimum of period of related experience as specified by the relevant ETQA.
- Subject matter experience, which may be established through recognition of prior learning (RPL).

Registration as an assessor with the relevant Education and Training Quality Assurance Body.

Proven inter-personal skills and the ability to:

- Maintain national and local industry standards.
- Act in the interest of the learner.
- Understand the need for transformation to redress the legacies of the past, and respect the cultural background and language of the learner.

NOTES

This qualification replaces qualification 23273, "National Certificate: Mechanical Engineering: Fitting", Level 2, 138 credits.

This reviewed qualification is the result of an inter-SETA collaborative process and therefore replaces the following qualifications:

- SAQA ID 23273 - National Certificate: Mechanical Engineering (Fitting) NQF Level 2.
- SAQA ID 13673 - National Certificate: Chemical Fitter (Interimly-registered) NQF Level 2.

This qualification establishes the foundational competencies for the following qualifications:

- National and Further Education Certificates: Mechanical Engineering (Fitting) NQF Level 3 and 4 respectively.
- National and Further Education Certificates: Mechanical Engineering (Pipe-Fitting) NQF Level 3 and 4 respectively.
- National and Further Education Certificates: Fluid Power (Fitting) NQF Level 3 and 4, respectively.

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	119454	Maintain and adapt oral/signed communication	Level 2	5
Fundamental	12444	Measure, estimate and calculate physical quantities and explore, describe and represent geometrical relationships in 2-dimensions in different life or workplace contexts	Level 2	3
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

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	119456	Write/present for a defined context	Level 2	5
Core	253440	Assemble mechanical components	Level 2	12
Core	12466	Explain the individual's role within business	Level 2	4
Core	12477	Identify engineering materials, their characteristics and applications and common metal tests used in engineering	Level 2	4
Core	13220	Keep the work area safe and productive	Level 2	8
Core	13219	Maintain static seals in machines and / or equipment	Level 2	4
Core	9881	Mark off basic regular engineering shapes	Level 2	6
Core	12215	Read, interpret and produce basic engineering drawings	Level 2	6
Core	119744	Select, use and care for engineering hand tools	Level 2	8
Core	12476	Select, use and care for engineering measuring equipment	Level 2	4
Core	12219	Select, use and care for engineering power tools	Level 2	6
Elective	9839	Apply and maintain safety in an electrical environment	Level 1	5
Elective	117867	Managing files in a Graphical User Interface (GUI) environment	Level 1	3
Elective	116932	Operate a personal computer system	Level 1	3
Elective	116938	Use a Graphical User Interface (GUI)-based word processor to create and edit documents	Level 1	4
Elective	117902	Use generic functions in a Graphical User Interface (GUI)-environment	Level 1	4
Elective	254357	Bend a pipe by means of a hydraulic pipe bender	Level 2	2
Elective	243069	Braze metals using the oxy-fuel brazing process	Level 2	6
Elective	13217	Collect and use information	Level 2	5
Elective	12218	Construct and test basic electronic circuits	Level 2	16
Elective	243067	Cut materials using the oxy-fuel gas cutting process (manual cutting)	Level 2	6
Elective	253496	Cut screw threads and install threaded pipe systems	Level 2	4
Elective	244690	Demonstrate basic knowledge of hydraulic components	Level 2	3
Elective	244691	Demonstrate basic knowledge of pneumatic components	Level 2	3
Elective	244686	Demonstrate understanding of the principles of fluid power	Level 2	6
Elective	253374	Describe the chemical industry's composition, its regulatory requirements and communication techniques	Level 2	2
Elective	12465	Develop a learning plan and a portfolio for assessment	Level 2	6
Elective	243075	Draw and interpret simple plate, pipe and structural steel plate, pipe and structural steel drawings	Level 2	6
Elective	244445	Follow basic health and safety practices underground	Level 2	5
Elective	244688	Identify hose and fluid power connectors	Level 2	3
Elective	253474	Install pipe hangers and supports	Level 2	4
Elective	13136	Install, test, maintain and commission basic electrical circuits	Level 2	16
Elective	253392	Maintain a conveyor belt installation	Level 2	6
Elective	253421	Make up a spare strand section for a pig cast machine	Level 2	2
Elective	9268	Manage basic personal finance	Level 2	6
Elective	13214	Operate and monitor a drilling machine to produce simple components	Level 2	6
Elective	13205	Operate and monitor a lathe to produce simple components	Level 2	12
Elective	253537	Overhaul the bogey of rolling stock	Level 2	2
Elective	12484	Perform basic fire fighting	Level 2	4
Elective	12483	Perform basic first aid	Level 2	4
Elective	119753	Perform basic welding/joining of metals	Level 2	8
Elective	13221	Perform routine maintenance	Level 2	8
Elective	253444	Repair a Rope/Hydraulic shovel	Level 2	4
Elective	253387	Repair a bag-type dust suppression system	Level 2	2
Elective	253424	Repair a belt/chain type bucket elevator	Level 2	4
Elective	253355	Repair a dredge	Level 2	4
Elective	254356	Repair a drum stacker	Level 2	5
Elective	253354	Repair a grate cooler	Level 2	3
Elective	253514	Repair a rotary drill	Level 2	4
Elective	253534	Repair air driven track bound mechanical loaders	Level 2	4
Elective	253445	Repair an air slide	Level 2	3
Elective	253441	Repair crushers	Level 2	4
Elective	253394	Repair double drum scraper winches	Level 2	6
Elective	253425	Repair internal combustion engines	Level 2	5

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Elective	253437	Repair mechanical rock breakers	Level 2	4
Elective	253535	Repair mono rope winches	Level 2	3
Elective	253414	Repair screw type conveyors	Level 2	3
Elective	253427	Repair track driven earth moving equipment	Level 2	4
Elective	253435	Repair underground locomotives	Level 2	8
Elective	253431	Replace a magnetic separator	Level 2	2
Elective	253360	Replace a mould wheel assembly on a pig cast machine strand	Level 2	2
Elective	253436	Replace a pneumatic drill on a clay gun	Level 2	2
Elective	253364	Replace a rotary valve on a bag house	Level 2	2
Elective	10741	Replace an in-line ventilation fan in an underground environment	Level 2	2
Elective	253365	Replace components on a chairlift installation	Level 2	4
Elective	253428	Replace components on an apron feeder	Level 2	2
Elective	253416	Replace mechanical components on a vibrating screen	Level 2	4
Elective	253362	Replace the screw of a screw type feeder	Level 2	2
Elective	12481	Sling loads	Level 2	4
Elective	12463	Understand and deal with HIV/AIDS	Level 2	3
Elective	117924	Use a Graphical User Interface (GUI)-based word processor to format documents	Level 2	5
Elective	253495	Use and select pipe systems and pipe components	Level 2	4
Elective	243063	Weld carbon steel work-pieces using the shielded metal arc welding process in the down-hand position.	Level 2	15
Elective	9322	Work in a team	Level 2	3
Elective	13297	Grind tools and drill bits	Level 3	4
Elective	253391	Maintain centrifugal pumps	Level 3	14
Elective	253497	Maintain positive displacement pumps	Level 3	10
Elective	253446	Overhaul pneumatic percussion drills	Level 3	4
Elective	253420	Repair a haul truck	Level 3	5
Elective	253454	Repair blow tanks	Level 3	2
Elective	253380	Repair self-propelled mobile machines	Level 3	5
Elective	253426	Replace a hammer mill	Level 3	4
Elective	253432	Replace components on a dragline	Level 3	8

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
Further Education and Training Certificate: Mechanical Engineering: Fitting

SAQA QUAL ID	*QUALIFICATION TITLE*		
59709	Further Education and Training Certificate: Mechanical Engineering: Fitting		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering & Technolog			
QUALIFICATION TYPE	*FIELD*	*SUBFIELD*	
Further Ed and Training Cert	6 - Manufacturing, Engineering and Technology	Engineering and Related Design	
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUAL CLASS*
Undefined	120	Level 4	Regular-Unit Stds Based

This qualification replaces:

Qual ID	Qualification Title	NQF Level	Min Credits	Replacement Status
23275	National Certificate: Mechanical Engineering: Fitting	Level 4	135	Will occur as soon as 59709 is registered

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

The purpose of this qualification is to build knowledge and skills that are required by employees in an engineering support environment (in various sectors of the economy) that would add value to the qualifying learner in terms of enrichment of the person, status and recognition. It provides an opportunity for learners to learn and apply skills in relation to the workplace.

The FETC Mechanical Engineering Fitter is the culmination of a learning path spanning three qualifications and is intended to produce a highly competent artisan who can perform his/her duties competently and confidently. They will apply mechanical and industrial engineering skills in order to meet the challenges of a competitive and demanding environment. This qualification will provide learners, education and training providers and employers with the standards and the range of learning required to produce these individuals.

Typical entrants to this qualification could be:

- Learners who have achieved the Level 3 qualification and are ready to progress to the Level 4 qualification.
- Semi-skilled fitters' assistants who choose to use this qualification as a "stepping stone" to artisanship through RPL.

This qualification will enable the learner to find employment as a skilled worker or artisan in an industrial plant or production environment. The status and relevance of this qualification will attract and retain quality learners and employees, who may even have the potential to progress to a National Certificate or Diploma at Level 5.

In this qualification, knowledge, skills and values are recognised showing the ability to:

- Demonstrate integrated analytical and diagnostic skills in order to fault find, diagnose and repair equipment and machinery during production/operations processes.
- Maintain, overhaul and commission mechanical machines, engineering systems and industrial plant installations.
- Understand advanced mechanical theory and interpret detailed engineering drawings and flow diagrams.

Qualified learners will also:

- Plan, schedule and evaluate own work (self assessment).
- Interact with team leaders and develop the capacity of team members to maintain and support quality, safety and health systems.
- Demonstrate appropriate communication skills.

Rationale:

The field of Mechanical Engineering (Fitting) is characterised by the provision of engineering maintenance, repair and installation services and support across a wide variety of industry sectors, namely:

- Manufacturing and Engineering (Metals, Plastics, Tyre and Rubber, Electrical Power Generation, Automotive Manufacturing).
- Chemical and Petrochemical.
- Mining.
- Transport (Maritime, Road, Rail and Aviation).
- Civil Engineering and Construction.
- Food and Beverages.
- Other engineering-related industry sectors.

The equipment requiring such services and support range from sophisticated engineering systems to all forms of industrial machinery (single and combined).

People working in the field of mechanical installation, maintenance and repair, require:

- Highly developed mechanical orientation with associated hand skills.
- Specialised technical skills (analytical and diagnostic).
- Communication skills.
- Team and leadership skills.
- Technology orientation in various contexts (Mechanical, control systems, electrical, electronic and information management).

Qualifying learners will obtain a Further Education Certificate in Mechanical Engineering (Fitting). This qualification focuses on developing the skills, knowledge and values necessary to complete the range of competencies required to maintain, overhaul and commission engineering systems and industrial plant installations as a skilled worker.

The qualification also provides:

- Opportunities for further learning in the field of Mechanical Engineering.
- Recognition of prior learning (RPL) opportunities to learners who have gained relevant experience in the workplace.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED IN PLACE
This qualification assumes that a National Certificate: Mechanical Engineering (Fitting) at NQF Level 3 or an equivalent qualification was obtained.

Recognition of Prior Learning:

This qualification can be obtained wholly or in part through the Recognition of Prior Learning (RPL). The learner should be thoroughly briefed on the process. Support and guidance should be provided. The process should not be so onerous as to prevent learners from taking up the RPL option in obtaining the qualification.

Access to Qualification:

Access to this qualification is open. However, it is preferred that learners have completed a National Certificate at NQF Level 3 (in trade-related sub-field) or equivalent.

QUALIFICATION RULES
Fundamental Component:

The Fundamental Component consists of Unit Standards in:

- Communications at Level 4 to the value of 46 credits.
- Mathematical Literacy at Level 3 to the value of 10 credits.
- All Unit Standards in the Fundamental Component are compulsory.

Core Component:

The Core Component consists of Unit Standards to the value of 52 credits all of which are compulsory.

Elective Component:

The Elective Component consists of a number of specializations each with its own set of Unit Standards. Learners are to choose a specialization area and must choose Elective Unit Standards to the value of 12 credits from the Elective Unit standards listed under that specialization so as to attain a minimum of 120 credits for this qualification.

Specialisation Area 1:

Learning Programme:

Fitting (Manufacturing, Engineering and Related Industries).

Learners must Elective Unit Standards from the list below to give a minimum of 12 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

- Elective; ID 13325; Maintain gearboxes; Level 4; 10 Credits.
- Elective; ID 253434; Maintain heat exchangers and pressure vessels; Level 3; 8 Credits.
- Elective; ID 13279; Maintain dynamic seals in machines and/or equipment; Level 3; 3 Credits.
- Elective; ID 13326; Maintain safety valves; Level 4; 4 Credits.
- Elective; ID 253386; Overhaul positive displacement pumps; Level 4; 7 Credits.

• Elective; ID 253376; Overhaul centrifugal pumps; Level 4; 7 Credits.

Total: 39 Credits.

Specialisation area 2:

Learning Programme:

Fitting (Chemical Industry).

Learners must do Unit Standard ID 14783 and must choose additional Elective Unit Standards from the list below to give a minimum of 12 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

• Elective; ID 14783; Conform to and apply legislation and operational instructions in chemical processing; Level 3; 4 Credits.
• Elective; ID 13325; Maintain gearboxes; Level 4; 10 Credits.
• Elective; ID 13279; Maintain dynamic seals in machines and/or equipment; Level 3; 3 Credits.
• Elective; ID 253386; Overhaul positive displacement pumps; Level 4; 7 Credits.
• Elective; ID 253376; Overhaul centrifugal pumps; Level 4; 7 Credits.

Total: 31 Credits.

Specialisation area 3:

Learning Programme:

Fitting (Mining Industry).

Learners must do Unit Standard ID 120406 and must choose additional Elective Unit Standards from the list below to give a minimum of 12 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

• Elective; ID 120406; Demonstrate an understanding of mining strategies applicable to the different depth environments; Level 4; 6 Credits.
• Elective; ID 13325; Maintain gearboxes; Level 4; 10 Credits.
• Elective; ID 253434; Maintain heat exchangers and pressure vessels; Level 3; 8 Credits.
• Elective; ID 13279; Maintain dynamic seals in machines and/or equipment; Level 3; 3 Credits.
• Elective; ID 13326; Maintain safety valves; Level 4; 4 Credits.
• Elective; ID 253386; Overhaul positive displacement pumps; Level 4; 7 Credits.
• Elective; ID 253376; Overhaul centrifugal pumps; Level 4; 7 Credits.
• Elective; ID 253375; Overhaul compressors; Level 3; 5 Credits.
• Elective; ID 253377; Overhaul the wheel end final drive assembly of a self propelled mobile machine; Level 3; 6 Credits.
• Elective; ID 253378; Overhaul a drum type separator; Level 3; 3 Credits.
• Elective; ID 253393; Overhaul a centrifuge; Level 3; 7 Credits.
• Elective; ID 253384; Perform maintenance on winding plant; Level 3; 8 Credits.
• Elective; ID 253447; Take samples and measurements on rotating machinery for conditioning monitoring purposes; Level 3; 3 Credits.
• Elective; ID 253388; Maintain glass equipment; Level 3; 6 Credits.

Total: 83 Credits

Specialisation area 4:

Learning Programme:

Fitting (Electrical Power Generation).

Learners must do Unit Standard ID 10195 and must choose additional Elective Unit Standards from the list below to give a minimum of 12 credits for the Elective Component:

Category; ID; Unit Standard Title; Level; Credits:

- Elective; ID 10195; Apply Engineering Principles and concepts in a Power Generation Process Plant; Level 3; 5 Credits.
- Elective; ID 13325; Maintain gearboxes; Level 4; 10 Credits.
- Elective; ID 253434; Maintain heat exchangers and pressure vessels; Level 3; 8 Credits.
- Elective; ID 13279; Maintain dynamic seals in machines and/or equipment; Level 3; 3 Credits.
- Elective; ID 13326; Maintain safety valves; Level 4; 4 Credits.
- Elective; ID 253386; Overhaul positive displacement pumps; Level 4; 7 Credits.
- Elective; ID 253376; Overhaul centrifugal pumps; Level 4; 7 Credits.

Total: 39 Credits.

EXIT LEVEL OUTCOMES

1. Demonstrate the skills and ability to overhaul, install and commission complex mechanical assemblies and engineering systems.

- Range: Complex mechanical assemblies may include hydraulic, pneumatic, hydro-pneumatic, production machines, e.g. process machines, packaging machines and integrated flow systems.
- Range: Where applicable, adjustments include close tolerance adjusting, repairing, re-adjustment, re-setting and re-alignment.
- Range: Fault finding and diagnosis are important competencies at this level.

2. Plan and schedule work according to machine-, plant- or system production and maintenance requirements.

3. Solve a variety of problems, both familiar and unfamiliar in terms of advanced mechanical theory and practice.

4. Demonstrate leadership through effective interaction and communication with clients, peers and supervisors and management.

- Range: Leadership (individual and team).
- Range: Technical report-writing.
- Range: Exploring options for further learning.

Critical Cross-Field Outcomes:

These are embedded in the unit standards, which make up the qualification and are thus also reflected in the Exit Level Outcomes of the qualification.

The critical cross-field outcomes are supported by the exit level outcomes as follows:

Identifying and solving problems in which responses display that responsible decisions using critical thinking have been made:

• Related to the installation, commissioning and overhauling machinery and engineering systems.
• Related to supervising job activities.
• Related to the application of specialised methods during mechanical fitting.

Working effectively with others as a member of a team, group, organization and community:

• All tasks and work-related experience are performed within a team environment.
• Taking into account, the safety of others.
• Communicating with production, quality control and supervisory personnel and/or clients.
• Acting in a leadership role.

Organising and managing oneself and one's activities responsibly and effectively:

• Related to planning and preparation for installation and commissioning activities.
• Developing best practice behaviour in work performance and adhering to standard operating procedures.
• Focussing on the maintenance of records and work-schedules.

Collecting, analyzing, organizing and critically evaluating information:

• Related to managing / supervising people and the lifting activity.
• Completion of technical reports related to the job activity.
• Solve familiar problems during the execution of lifting tasks.
• During the planning and preparation of the mechanical handling activity.

Communicating effectively using visual, mathematical and/or language skills:

• During supervision and the execution of job activities.
• Execution of commands and completion of technical reports related to the job activity.
• Communicating as a team leader or supervisor.

Using science and technology effectively and critically, showing responsibility toward the environment and health of others:

• Implementing methods and techniques based on advanced knowledge of mechanical fitting.
• Solving problems and applying science and technology to the job activity.

Demonstrate an understanding of the world as a set of related systems by recognizing that problem contexts do not exist in isolation:

• Integrating the task with the plant installation's/engineering system's functionality.
• Solving problems through the integration of various sources of information
• Demonstrating and understanding of related systems through the use of general and specific channels of communication when dealing with peers, production, quality control and supervisory personnel and/or clients.

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

1.1 Engineering system operation, overhaul, recondition and commissioning procedures are explained and demonstrated in terms of worksite practice and manufacturers' prescribed guidelines and specifications.

1.2 Solutions to problems are demonstrated during the commissioning process and are based on a clear analysis of information gathered through the use of diagnostic procedures.
1.3 Inspection and testing is conducted to ensure that the plant, equipment and systems have been restored and the cause of the problem rectified.
1.4 Procedures are modified to respond to specific environmental conditions, where appropriate.

Range:

Commissioning includes:

- Pre-assembly and pre-installation tests.
- Assimilation tests and bench tests.
- Real-time running tests.

Associated Assessment Criteria for Exit Level Outcome 2:

2.1 Planning and scheduling of own work is demonstrated in terms of productivity, safety, health and the environment.
2.2 Work flow is explained and demonstrated, based on job information, in terms of standard worksite practices and the demonstration of the ability to read and interpret detailed engineering drawings.
2.3 Production and maintenance personnel are consulted and machine downtime is minimised.

Associated Assessment Criteria for Exit Level Outcome 3:

3.1 Mechanical principles are applied to establish the cause of plant, equipment and/or system malfunction and faultfinding techniques are used to understand and rectify related problems
3.2 Solutions to maintenance or production problems are based on a clear analysis of information gathered through diagnostic procedures.
3.3 Procedures are modified in order to respond to unfamiliar problems by demonstrating the ability to discuss and record alternative solutions to familiar and unfamiliar problems.

Associated Assessment Criteria for Exit Level Outcome 4:

4.1 Relationships with peers, supervisors and management are established and leadership is demonstrated by assertive communication and behaviour within the workplace.
4.2 Technical writing skills are applied in recording engineering and related information, in order to understand, evaluate and report on machine, plant and system faults and problems.
4.3 Learning opportunities and preparation requirements are identified and a learning plan is developed in terms of vertical articulation and the range of choices available.

Integrated Assessment:

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

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

- Assessment of Communication and Mathematical Literacy should be integrated as far as possible with other aspects and should use practical administration 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 or will work. 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 a range of summative assessment methods and assess combinations of practical, applied, foundational and reflective competencies.

• Assessors must assess and give credit for the evidence of learning that has already been acquired and could include formal, non-formal learning and work experience.

• Assessment should ensure that all specific outcomes, embedded knowledge and critical cross-field outcomes are evaluated in an integrated manner.

• Integrated assessment instruments may combine practical and theoretical components of assessment with the following unit standards in relation to the exit level outcomes:

Exit Level Outcomes and Associated Unit Standards:

Demonstrate the skills and ability to overhaul, install and commission complex mechanical assemblies and engineering systems:

Category; ID; Title; Level; Credits:

• Core; ID (K.NEW); Maintain pneumatic systems; Level 4; 8 Credits.
• Core; ID (J.NEW); Maintain hydraulic systems; Level 4; 8 Credits.
• Core; ID 13299; Commission assembly/machine; Level 4; 8 Credits.
• Core; ID 13327; Diagnose and repair faults on equipment and machinery during production/operation; Level 4; 24 Credits.
• Fundamental; ID 119457; Interpret and use information from texts; Level 3; 5 Credits.

Plan and schedule work according to machine-, plant- or system production and maintenance requirements:

Category; ID; Title; Level; Credits:

• Core; ID (K.NEW); Maintain pneumatic systems; Level 4; 8 Credits.
• Core; ID (J.NEW); Maintain hydraulic systems; Level 4; 8 Credits.
• Core; ID 13224; Monitor the application of safety, health and environmental protection procedures; Level 4; 4 Credits.
• Core; ID 13299; Commission assembly/machine; Level 4; 8 Credits.

Solve a variety of problems, both familiar and unfamiliar in terms of advanced mechanical theory and practice:

Category; ID; Title; Level; Credits:

• Core; ID 13327; Diagnose and repair faults on equipment and machinery during production/operation; Level 4; 24 Credits.
• Core; ID (K.NEW); Maintain pneumatic systems; Level 4; 8 Credits.
• Core; ID (J.NEW); Maintain hydraulic systems; Level 4; 8 Credits.
• Fundamental; ID 119457; Interpret and use information from texts; Level 3; 5 Credits.
• Core; ID 13224; Monitor the application of safety, health and environmental protection procedures; Level 4; 4 Credits.
• Core; ID 13299; Commission assembly/machine; Level 4; 8 Credits.

Demonstrate leadership through effective interaction and communication with clients, peers and supervisors and management:

Category; ID; Title; Level; Credits:

- Fundamental; ID 119472; Accommodate audience and context needs in oral/signed communication ; Level 3; 5 Credits.
- Fundamental; ID 119457; Interpret and use information from texts; Level 3; 5 Credits.
- Core; ID 119471 ; Use language and communication in occupational learning programmes; Level 4; 5 Credits.
- Core; ID 13224; Monitor the application of safety, health and environmental protection procedures; Level 4; 4 Credits.
- Core; ID 13299 ; Commission assembly/machine; Level 4; 8 Credits.
- Core; ID (K.NEW); Maintain pneumatic systems; Level 4; 8 Credits.
- Core; ID (J.NEW); Maintain hydraulic systems; Level 4; 8 Credits.

INTERNATIONAL COMPARABILITY

In benchmarking the reviewed Mechanical Engineering (Fitting) Level 4 qualification against international qualifications, examples in different parts of the world were investigated.

New Zealand (www.kiwiquals.govt.nz) in terms of the New Zealand Qualifications Framework (NZQF):

- National Certificate in Engineering (General Engineering-Mechanical) (Level 4) - Competenz (Training Provider).
- National Certificate in Mechanical Engineering (Level 4)-Competenz (Training Provider).

Australia (www.ntis.gov.au) in terms of the Australian Quality Training Framework (AQTF):

The following information was obtained on the website: http://www.ntis.au (National Information Training System) with regards to qualifications in mechanical engineering training streams in Australia.

"Australian Apprenticeships" is the new name for the scheme formerly known as 'New Apprenticeships'.

Australian apprenticeships combine time at work with training and can be full-time, part-time or school-based, are recent improvements in VET introduced in Australia.

The qualifications for mechanical fitters cover:

- Certificate IV Engineering - Mechanical Trade.
- Certificate IV in Gas Fitting.
- Certificate IV in Mine Mechanical Engineering.

United Kingdom (England and Scotland) - from www.ecitb.org.uk:

The qualification from the National and Scottish Vocational Qualifications (N/SVQ) which relates to standards-based programme is the Engineering Construction Industry Training Board's N/SVQ Maintaining Plant and Systems - Mechanical. This programme is the closest programme related to the Mechanical Fitter Level 4.

It comprises:

- Maintaining Plant & Systems Mechanical N/SVQ-Mandatory Units.
- Maintaining Plant & Systems Mechanical N/SVQ-Technical Options Set A.

• Maintaining Plant & Systems Mechanical N/SVQ-Technical Options Set B.

The NC Mechanical Engineering (Fitting) Level 4 compares well to the qualifications found in New Zealand, Australia and the United Kingdom.

African Comparability:

Southern African Development Community (SADC)-Zimbabwe and Botswana:

Alignment with the United Kingdom's model of Vocational Education and Training (VET), through the London City and Guilds qualification framework and the National Vocational Qualification system (NVQ) - The Botswana National Qualifications Act was passed in 1998. At this present time, focus on the development of standards-based qualifications through a Botswana Vocation Education and Training System (BVET) has revolved around the Wholesale and Retail and Tourism sectors.

Currently, Botswana mechanical fitters are trained through the apprenticeship system. The length and duration of the practical and theoretical components differ slightly to the South African apprenticeship system, but the learning competencies are similar, with a focus on the predominant diamond mining and small local manufacturing and engineering industries.

East African Community (EAC):

The three member states of the EAC; Kenya, Tanzania and Uganda, are in the process of the harmonisation of education and training systems within the EAC. Currently, no qualification infrastructure exists.

Canada:

Information regarding training was also found on the website of the British Columbia Institute of Technology (www.bcit.ca), The College of The Rockies (www.cotr.bc.ca) and North Alberta Institute of Technology (www.nait.ca). The full mechanical fitter qualification is obtained over a four-year period. The "job description" of the mechanical fitter is similar - mechanical fitters install, repair, overhaul and maintain all types of machinery and heavy mechanical equipment".

Conclusion: The Canadian qualifications related to mechanical fitting can be used interchangeably with the qualifications developed for the South African manufacturing and engineering industries, serving a similar purpose.

United States:

In the United States model, the mechanical fitter qualification is achieved over a four-year period and is similar to the traditional apprenticeship system in South Africa. The methodology is competency-based as opposed to outcomes-based.

The programme content however, is similar to the broad context of Mechanical Engineering (Fitting) Levels 2, 3 and 4.

Conclusion: The reviewed mechanical fitter qualification L4 is in line with the US example for the final year/level of the American apprenticeship programme.

• "They fit bearings, align gears and wheels, attach motors and connect belts according to the manufacturers' specifications. Precision levelling and alignment are important to getting the job right. As the machinery is put into use, mechanical fitters perform preventive maintenance and fix broken or malfunctioning parts".

Summary of international comparison with NC Mechanical Engineering (Fitting) Level 4:

• Content: The qualifications from the various countries all address the range of mechanical competencies included in Level 4, thus attending to the need to fulfil the requirements of being introductory by nature.
• Progression: The international qualifications all address a progression of competencies.
• Demonstrate Work Practices.

Internationally, learners or apprentices demonstrate the ability to fault-find/diagnose, overhaul, commission engineering systems (Level 4), albeit in the final phase/level of a single apprenticeship of 4 years.

• Conclusion: These outcomes are covered within the Level 4 certificate developed for South Africa.

• Learning delivery: The learning delivery process in all the examples included on-the-job (practical) and off-the-job (theoretical) components.

• Outcomes-Based: All the examples found either directly or indirectly comply with principles of outcomes-based learning, particularly in terms of outcomes representing meaningful units of learning and assessment being conducted continuously (formatively). There is generally a final integrated assessment, typically called a trade test, where the candidate is required to demonstrate specific and core (cross-field) knowledge and skills.

" Apprenticeships and VET programmes: In all the examples found, learning is vocational-based. In some countries (England, Scotland, New Zealand and Australia) these are called "modern apprenticeships". These take the form of two categories, namely a programme-led apprenticeship where learners are able to follow a vocational programme at a college and then seek employment as trainees/apprentice/interns in order to qualify as artisans; and an employer-led apprenticeship, in which learners are engaged in a formal contract of learning and most learning is workplace-based. In most cases learners "earn while they learn".

Application (Purpose): As is the intention with the South African qualifications, the international qualifications all aim at preparing learners for:

• Working in process or manufacturing oriented industries where they contribute to the effective and efficient maintenance of plant and equipment.
• Thoroughly understand and apply mechanical knowledge to troubleshoot all types of machines.
• Fluid control systems or demonstrate troubleshooting abilities.
• Commissioning of machines and engineering systems.

Concluding remarks:

In terms of training and qualification, it is clear that a learner will obtain a specific qualification as Mechanical Fitter, after a vocational learning process (apprenticeship or similar) of approximately 4 years. It must be noted that level descriptors in some countries may differ but that the ultimate outcomes are in essence the same.

The outcomes of the FETC Mechanical Engineering (Fitting) Level 4 certificate developed for South Africa, compares favourably with the rest of the international community and by every indication, is compatible with those countries who engage with outcomes-and standards-based qualifications as well as apprenticeships.

ARTICULATION OPTIONS

The Qualification has been designed and structured so that qualifying learners can move from one engineering context to another. This can be achieved by the appropriate selection of credits in the elective category.

Equally, holders of other similar Fitting Qualifications may be evaluated against this Qualification for the purpose of Recognition of Prior Learning.

Vertical articulation may exist (wholly or in part) in the following National Certificates at NQF Level 5:

- ID: 21007; National Certificate: Automotive Component Manufacturing and Assembly NQF Level 5.
- ID: 22773; National Certificate: Mechatronics NQF Level 5.

Horizontal articulation:

Fundamental learning at this level applies to equivalent credit accrual for engineering-related qualifications at NQF Level 4.

Core learning at this level applies to equivalent credit accrual for some unit standards in most trade-related engineering qualifications:

- ID: 58721; Further Education and Training Certificate: Engineering Fabrication NQF Level 4.
- ID: 23256; Further Education and Training Certificate: Mechanical Engineering (Fitting and Machining) NQF Level 4.
- ID: 57887; Further Education and Training Certificate: Welding Application and Practice NQF Level 4.

Other horizontal articulation options may exist and need further investigation in cases where recognition of prior learning is sought.

MODERATION OPTIONS

- Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered with an appropriate Education and Training Quality Assurance Body (ETQA) or with an ETQA which has a Memorandum of Understanding (MOU) with the relevant ETQA.

- Any institution offering learning that will enable the achievement of this qualification must be accredited as a Training Provider with the relevant ETQA or with an ETQA that has a Memorandum of Understanding (MOU) with the relevant ETQA.

- Moderation of assessment will be overseen by the relevant ETQA or by an ETQA that has a Memorandum of Understanding (MOU) with the relevant ETQA according to that ETQA's guidelines for assessment and moderation.

- Moderation-includes both internal and external moderation of assessment/s at the 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 in exit level outcomes described in this Qualification.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

The following criteria should be applied by a relevant ETQA as a minimum requirement:

Assessors should be in possession of an appropriate qualification, namely:

• Mechanical Engineering (Fitting) at NQF Level 4 and a minimum period of related experience as specified by the relevant ETQA.
• An artisan qualification in Mechanical Fitting (Trade test certificate or completed contract of apprenticeship) with a minimum period of related experience as specified by the relevant ETQA.
• Subject matter experience, which may be established through recognition of prior learning (RPL).

Registration as an assessor with the relevant Education and Training Quality Assurance Body.

Proven inter-personal skills and the ability to:

• Maintain national and local industry standards.
• Act in the interest of the learner.
• Understand the need for transformation to redress the legacies of the past.
• Respect the cultural background and language of the learner.

NOTES

This reviewed qualification is the result of an inter-SETA collaborative process and therefore replaces the following qualifications:

• SAQA ID 23275 - Further Education and Training Certificate: Mechanical Engineering (Fitting) NQF Level 4.
• SAQA ID 13656 - National Certificate: Chemical Fitter (Interimly-registered) NQF Level 4.

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	119472	Accommodate audience and context needs in oral/signed communication	Level 3	5
Fundamental	119458	Analyse and respond to a variety of literary texts	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	9015	Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life related problems	Level 4	6
Fundamental	119462	Engage in sustained oral/signed communication and evaluate spoken/signed texts	Level 4	5
Fundamental	119469	Read/view, analyse and respond to a variety of texts	Level 4	5
Fundamental	9016	Represent analyse and calculate shape and motion in 2- and 3-dimensional space in different contexts	Level 4	4
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	13299	Commission assembly / machine	Level 4	8
Core	13327	Diagnose and repair faults on equipment and machinery during production/operation	Level 4	24
Core	253415	Maintain hydraulic systems	Level 4	8
Core	253361	Maintain pneumatic systems	Level 4	8
Core	13224	Monitor the application of safety, health and environmental protection procedures	Level 4	4
Elective	10195	Apply Engineering Principles and concepts in a Power Generation Process Plant	Level 3	5
Elective	14783	Conform to and apply legislation and operational instructions in chemical processing	Level 3	4
Elective	12429	Develop a personal financial plan	Level 3	2
Elective	254355	Inspect and conduct routine maintenance on an overhead crane	Level 3	2
Elective	13282	Maintain brakes and clutches	Level 3	6
Elective	13279	Maintain dynamic seals in machines and / or equipment	Level 3	3

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Elective	253388	Maintain glass equipment	Level 3	5
Elective	253434	Maintain heat exchangers and pressure vessels	Level 3	8
Elective	253393	Overhaul a centrifuge	Level 3	7
Elective	253378	Overhaul a drum type separator	Level 3	3
Elective	253375	Overhaul compressors	Level 3	5
Elective	253386	Overhaul positive displacement pumps	Level 3	7
Elective	253377	Overhaul the wheel-end final drive assembly of a self-propelled mobile machine	Level 3	6
Elective	253384	Perform maintenance on winding plant	Level 3	8
Elective	253447	Take samples and measurements on rotating machinery for condition monitoring purposes	Level 3	5
Elective	13254	Contribute to the implementation and maintenance of business processes	Level 4	10
Elective	13325	Maintain gearboxes	Level 4	10
Elective	13326	Maintain safety valves	Level 4	4
Elective	253376	Overhaul centrifugal pumps	Level 4	7
Elective	253357	Perform routine maintenance and inspections on diesel engines used for emergency plant operations	Level 4	5
Elective	13301	Produce complex engineering drawings	Level 4	6
Elective	13328	Refurbish machines	Level 4	24

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair a grate cooler

SAQA US ID	*UNIT STANDARD TITLE*		
253354	Repair a grate cooler		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	3

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing a grate cooler.

SPECIFIC OUTCOME 2
Prepare to repair a grate cooler.

SPECIFIC OUTCOME 3
Repair the grate cooler.

SPECIFIC OUTCOME 4
Test the grate cooler and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair a dredge

SAQA US ID	*UNIT STANDARD TITLE*		
253355	Repair a dredge		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing a dredge.

SPECIFIC OUTCOME 2
Prepare to repair the dredge.

SPECIFIC OUTCOME 3
Repair the dredge.

SPECIFIC OUTCOME 4
Test the dredge and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Inspect a safety detaching hook

SAQA US ID	*UNIT STANDARD TITLE*		
253356	Inspect a safety detaching hook		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to inspecting a safety detaching hook.

SPECIFIC OUTCOME 2
Prepare to inspect a safety detaching hook.

SPECIFIC OUTCOME 3
Inspect the safety detaching hook.

SPECIFIC OUTCOME 4
Complete the inspection process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Perform routine maintenance and inspections on diesel engines used for emergency plant operations

SAQA US ID	*UNIT STANDARD TITLE*		
253357	Perform routine maintenance and inspections on diesel engines used for emergency plant operations		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	5

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

SPECIFIC OUTCOME 1
Explain the principles of operation and factors critical to maintaining a diesel engine.

SPECIFIC OUTCOME 2
Prepare to perform routine maintenance and inspection on a diesel engine.

SPECIFIC OUTCOME 3
Perform routine maintenance on a diesel engine.

SPECIFIC OUTCOME 4
Perform start-up and run-down inspections and monitor operation.

SPECIFIC OUTCOME 5
Care for tools and equipment and record information on work done.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair material separating/classifying equipment

SAQA US ID	*UNIT STANDARD TITLE*		
253358	Repair material separating/classifying equipment		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing material separating/classifying equipment.

SPECIFIC OUTCOME 2
Prepare to repair material separating/classifying equipment.

SPECIFIC OUTCOME 3
Repair material separating/classifying equipment.

SPECIFIC OUTCOME 4
Test the material separating/classifying equipment and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair shuttle cars

SAQA US ID	*UNIT STANDARD TITLE*		
253359	Repair shuttle cars		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	5

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing shuttle cars.

SPECIFIC OUTCOME 2
Prepare to repair shuttle cars.

SPECIFIC OUTCOME 3
Repair shuttle cars.

SPECIFIC OUTCOME 4
Test the shuttle car and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace a mould wheel assembly on a pig cast machine strand

SAQA US ID	*UNIT STANDARD TITLE*		
253360	Replace a mould wheel assembly on a pig cast machine strand		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing a mould wheel assembly on a pig cast machine strand.

SPECIFIC OUTCOME 2
Prepare to replace the mould wheel assembly.

SPECIFIC OUTCOME 3
Replace the mould wheel assembly.

SPECIFIC OUTCOME 4
Test the mould wheel assembly and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain pneumatic systems

SAQA US ID	*UNIT STANDARD TITLE*		
253361	Maintain pneumatic systems		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
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
13321	Maintain fluid power / pneumatic systems	Level 4	16	Will occur as soon as 253361 is registered

SPECIFIC OUTCOME 1
Identify and discuss the applications of a pneumatic system.

SPECIFIC OUTCOME 2
Plan and prepare for pneumatic system maintenance.

SPECIFIC OUTCOME 3
Maintain pneumatic system.

SPECIFIC OUTCOME 4
Care for and store tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace the screw of a screw type feeder

SAQA US ID	*UNIT STANDARD TITLE*		
253362	Replace the screw of a screw type feeder		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing the screw of a screw type feeder.

SPECIFIC OUTCOME 2
Prepare to replace the screw of a screw type feeder.

SPECIFIC OUTCOME 3
Replace the screw of a screw type feeder.

SPECIFIC OUTCOME 4
Test the screw type feeder and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace a rotary valve on a bag house

SAQA US ID	*UNIT STANDARD TITLE*		
253364	Replace a rotary valve on a bag house		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing a rotary valve on a bag house.

SPECIFIC OUTCOME 2
Prepare to replace a rotary valve on a bag house.

SPECIFIC OUTCOME 3
Replace a rotary valve on a bag house.

SPECIFIC OUTCOME 4
Test the rotary valve and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace components on a chairlift installation

SAQA US ID	*UNIT STANDARD TITLE*		
253365	Replace components on a chairlift installation		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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
10871	Replace components on a chairlift installation	Level 2	4	Will occur as soon as 253365 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to replacing components on a chairlift installation.

SPECIFIC OUTCOME 2
Prepare to replace components on a chairlift installation.

SPECIFIC OUTCOME 3
Replace the components on a chairlift installation.

SPECIFIC OUTCOME 4
Test the chairlift installation and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Describe the chemical industry's composition, its regulatory requirements and communication techniques

SAQA US ID	*UNIT STANDARD TITLE*		
253374	Describe the chemical industry's composition, its regulatory requirements and communication techniques		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Identify and interpret organisational structures, and personal functions within the company or business.

SPECIFIC OUTCOME 2
Apply and adhere to communication procedures within the company or business.

SPECIFIC OUTCOME 3
Interpret and apply legislative requirements within the company or business.

SPECIFIC OUTCOME 4
Apply safety and security procedures.

SPECIFIC OUTCOME 5
Apply administrative procedures related to the company and or business.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2
Elective	59729	National Certificate: Mechanical Handling (Rigging)	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul compressors

SAQA US ID	*UNIT STANDARD TITLE*		
253375	Overhaul compressors		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	5

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
10836	Overhaul a piston-type air compressor	Level 3	7	Will occur as soon as 253375 is registered
10838	Overhaul a vane-type air compressor	Level 3	7	Will occur as soon as 253375 is registered
10840	Overhaul a screw-type air compressor	Level 3	7	Will occur as soon as 253375 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling compressors.

SPECIFIC OUTCOME 2
Prepare to overhaul compressors.

SPECIFIC OUTCOME 3
Overhaul compressors.

SPECIFIC OUTCOME 4
Test the compressor and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul centrifugal pumps

SAQA US ID	*UNIT STANDARD TITLE*		
253376	Overhaul centrifugal pumps		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	7

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
10738	Overhaul a single-stage centrifugal pump	Level 3	6	Will occur as soon as 253376 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling centrifugal pumps.

SPECIFIC OUTCOME 2
Prepare to overhaul a centrifugal pump.

SPECIFIC OUTCOME 3
Overhaul the centrifugal pump.

SPECIFIC OUTCOME 4
Test the pump and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul the wheel-end final drive assembly of a self-propelled mobile machine

SAQA US ID	*UNIT STANDARD TITLE*		
253377	Overhaul the wheel-end final drive assembly of a self-propelled mobile machine		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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
10797	Overhaul the wheel-end final drive assembly of a self-propelled mobile machine	Level 3	6	Will occur as soon as 253377 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling the wheel-end final drive assembly of a self-propelled mobile machine.

SPECIFIC OUTCOME 2
Prepare to overhaul the wheel-end final drive assembly of a self-propelled mobile machine.

SPECIFIC OUTCOME 3
Overhaul the wheel-end final drive assembly of a self-propelled mobile machine.

SPECIFIC OUTCOME 4
Test the wheel-end final drive assembly and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul a drum type separator

SAQA US ID	*UNIT STANDARD TITLE*		
253378	Overhaul a drum type separator		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling a drum type separator.

SPECIFIC OUTCOME 2
Prepare to overhaul a drum type separator.

SPECIFIC OUTCOME 3
Overhaul a drum type separator.

SPECIFIC OUTCOME 4
Test the drum type separator and Prepare for Operation and/or Production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair mechanised coal mining equipment

SAQA US ID	*UNIT STANDARD TITLE*		
253379	Repair mechanised coal mining equipment		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	9

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing mechanised coal mining equipment.

SPECIFIC OUTCOME 2
Prepare to repair mechanised coal mining equipment.

SPECIFIC OUTCOME 3
Repair the mechanised coal mining equipment.

SPECIFIC OUTCOME 4
Test the mechanised coal mining equipment and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair self-propelled mobile machines

SAQA US ID	*UNIT STANDARD TITLE*		
253380	Repair self-propelled mobile machines		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	5

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing the hydraulic braking system of a self-propelled machine.

SPECIFIC OUTCOME 2
Prepare to repair the self-propelled mobile machine.

SPECIFIC OUTCOME 3
Repair the self-propelled mobile machine.

SPECIFIC OUTCOME 4
Test the self-propelled mobile machine and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain filter presses

SAQA US ID	*UNIT STANDARD TITLE*		
253382	Maintain filter presses		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to maintaining filter presses.

SPECIFIC OUTCOME 2
Prepare to maintain filter presses.

SPECIFIC OUTCOME 3
Maintain filter presses.

SPECIFIC OUTCOME 4
Test the filter press and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain glass lined equipment

SAQA US ID	*UNIT STANDARD TITLE*		
253383	Maintain glass lined equipment		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	5

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

SPECIFIC OUTCOME 1
Explain the factors critical to maintaining glass lined equipment.

SPECIFIC OUTCOME 2
Prepare to maintain glass lined equipment.

SPECIFIC OUTCOME 3
Maintain glass lined equipment.

SPECIFIC OUTCOME 4
Test the glass lined equipment and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Perform maintenance on winding plant

SAQA US ID	*UNIT STANDARD TITLE*		
253384	Perform maintenance on winding plant		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	8

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

SPECIFIC OUTCOME 1
Explain the factors critical to performing maintenance on winding plant.

SPECIFIC OUTCOME 2
Prepare to perform maintenance on winding plant.

SPECIFIC OUTCOME 3
Perform maintenance on winding plant.

SPECIFIC OUTCOME 4
Complete the maintenance process and prepare for production and or operation.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair bag-applicator machines

SAQA US ID	*UNIT STANDARD TITLE*		
253385	Repair bag-applicator machines		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	5

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing bag-applicator machines.

SPECIFIC OUTCOME 2
Prepare to repair bag-applicator machines.

SPECIFIC OUTCOME 3
Repair the bag-applicator machine.

SPECIFIC OUTCOME 4
Test the bag-applicator machine and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul positive displacement pumps

SAQA US ID	*UNIT STANDARD TITLE*		
253386	Overhaul positive displacement pumps		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
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
10853	Overhaul a positive displacement pump	Level 3	6	Will occur as soon as 253386 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling positive displacement pumps.

SPECIFIC OUTCOME 2
Prepare to overhaul a positive displacement pump.

SPECIFIC OUTCOME 3
Overhaul the positive displacement pump.

SPECIFIC OUTCOME 4
Test the pump and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair a bag-type dust suppression system

SAQA US ID	*UNIT STANDARD TITLE*		
253387	Repair a bag-type dust suppression system		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing a bag-type dust suppression system.

SPECIFIC OUTCOME 2
Prepare to repair the bag-type dust suppression system.

SPECIFIC OUTCOME 3
Repair the bag-type dust suppression system.

SPECIFIC OUTCOME 4
Test the bag-type dust suppression system and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain glass equipment

SAQA US ID	*UNIT STANDARD TITLE*		
253388	Maintain glass equipment		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	5

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

SPECIFIC OUTCOME 1
Explain the factors critical to maintaining glass equipment.

SPECIFIC OUTCOME 2
Prepare to maintain glass equipment.

SPECIFIC OUTCOME 3
Maintain the glass equipment.

SPECIFIC OUTCOME 4
Test the glass equipment and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace the girth gear and pinion on a mill

SAQA US ID	*UNIT STANDARD TITLE*		
253390	Replace the girth gear and pinion on a mill		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing a girth gear and pinion on a mill.

SPECIFIC OUTCOME 2
Prepare to replace a girth gear and pinion on a mill.

SPECIFIC OUTCOME 3
Replace the girth gear and pinion on a mill.

SPECIFIC OUTCOME 4
Test the girth gear and pinion on a mill and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain centrifugal pumps

SAQA US ID	*UNIT STANDARD TITLE*		
253391	Maintain centrifugal pumps		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	14

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

SPECIFIC OUTCOME 1
Identify and discuss the applications of centrifugal pumps.

SPECIFIC OUTCOME 2
Plan and prepare for pump maintenance.

SPECIFIC OUTCOME 3
Maintain pump.

SPECIFIC OUTCOME 4
Care for and store system maintenance tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain a conveyor belt installation

SAQA US ID	*UNIT STANDARD TITLE*		
253392	Maintain a conveyor belt installation		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	6

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

SPECIFIC OUTCOME 1
Explain the factors critical to maintaining a conveyor belt installation.

SPECIFIC OUTCOME 2
Prepare to maintain a conveyor belt installation.

SPECIFIC OUTCOME 3
Maintain a conveyor belt installation.

SPECIFIC OUTCOME 4
Test the conveyor belt installation, and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul a centrifuge

SAQA US ID	*UNIT STANDARD TITLE*		
253393	Overhaul a centrifuge		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	7

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

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling a centrifuge.

SPECIFIC OUTCOME 2
Prepare to overhaul the centrifuge.

SPECIFIC OUTCOME 3
Overhaul the centrifuge.

SPECIFIC OUTCOME 4
Test the centrifuge and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair double drum scraper winches

SAQA US ID	*UNIT STANDARD TITLE*		
253394	Repair double drum scraper winches		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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
10739	Repair a double drum scraper winch	Level 2	4	Will occur as soon as 253394 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to repairing double drum scraper winches.

SPECIFIC OUTCOME 2
Prepare to repair double drum scraper winches.

SPECIFIC OUTCOME 3
Repair double drum scraper winches.

SPECIFIC OUTCOME 4
Test the double drum scraper winch and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair jig washers

SAQA US ID	*UNIT STANDARD TITLE*		
253395	Repair jig washers		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing jig washers.

SPECIFIC OUTCOME 2
Prepare to repair jig washers.

SPECIFIC OUTCOME 3
Repair jig washers.

SPECIFIC OUTCOME 4
Test the jig washer and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair a vacuum pump

SAQA US ID	*UNIT STANDARD TITLE*		
253396	Repair a vacuum pump		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing a vacuum pump.

SPECIFIC OUTCOME 2
Prepare to repair the vacuum pump.

SPECIFIC OUTCOME 3
Repair the vacuum pump.

SPECIFIC OUTCOME 4
Test the vacuum pump, and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair rotary kilns

SAQA US ID	*UNIT STANDARD TITLE*		
253397	Repair rotary kilns		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	7

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing rotary kilns.

SPECIFIC OUTCOME 2
Prepare to repair rotary kilns.

SPECIFIC OUTCOME 3
Repair rotary kilns.

SPECIFIC OUTCOME 4
Test the rotary kiln and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair screw type conveyors

SAQA US ID	*UNIT STANDARD TITLE*		
253414	Repair screw type conveyors		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	3

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing screw type conveyors.

SPECIFIC OUTCOME 2
Prepare to repair screw type conveyors.

SPECIFIC OUTCOME 3
Repair screw type conveyors.

SPECIFIC OUTCOME 4
Test the screw type conveyor and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain hydraulic systems

SAQA US ID	*UNIT STANDARD TITLE*		
253415	Maintain hydraulic systems		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	8

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

SPECIFIC OUTCOME 1
Identify and discuss the principles and applications of hydraulics.

SPECIFIC OUTCOME 2
Plan and prepare for hydraulic system maintenance.

SPECIFIC OUTCOME 3
Maintain the hydraulic system.

SPECIFIC OUTCOME 4
Care for and store system maintenance tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace mechanical components on a vibrating screen

SAQA US ID	*UNIT STANDARD TITLE*		
253416	Replace mechanical components on a vibrating screen		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing mechanical components on a vibrating screen.

SPECIFIC OUTCOME 2
Prepare to replace mechanical components on a vibrating screen.

SPECIFIC OUTCOME 3
Replace mechanical components on a vibrating screen.

SPECIFIC OUTCOME 4
Test the vibrating screen and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair a rotary packer

SAQA US ID	*UNIT STANDARD TITLE*		
253418	Repair a rotary packer		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	2

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
116656	Repair a rotary packer	Level 3	2	Will occur as soon as 253418 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to repairing a rotary packer.

SPECIFIC OUTCOME 2
Prepare to repair the rotary packer.

SPECIFIC OUTCOME 3
Repair the rotary packer.

SPECIFIC OUTCOME 4
Test the rotary packer and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace components on a stage loader

SAQA US ID	*UNIT STANDARD TITLE*		
253419	Replace components on a stage loader		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	3

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing components on a stage loader.

SPECIFIC OUTCOME 2
Prepare to replace components on a stage loader.

SPECIFIC OUTCOME 3
Replace components on a stage loader.

SPECIFIC OUTCOME 4
Test the stage loader and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair a haul truck

SAQA US ID	*UNIT STANDARD TITLE*		
253420	Repair a haul truck		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	5

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing a haul truck.

SPECIFIC OUTCOME 2
Prepare to repair a haul truck.

SPECIFIC OUTCOME 3
Repair a haul truck.

SPECIFIC OUTCOME 4
Test the haul truck and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Make up a spare strand section for a pig cast machine

SAQA US ID	*UNIT STANDARD TITLE*		
253421	Make up a spare strand section for a pig cast machine		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to making up a spare strand section for a pig cast machine.

SPECIFIC OUTCOME 2
Prepare to make up a spare strand section for a pig cast machine.

SPECIFIC OUTCOME 3
Make up a spare strand section for a pig cast machine.

SPECIFIC OUTCOME 4
Complete the process and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair boom type stackers

SAQA US ID	*UNIT STANDARD TITLE*		
253422	Repair boom type stackers		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	3

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing boom type stackers.

SPECIFIC OUTCOME 2
Prepare to repair boom type stackers.

SPECIFIC OUTCOME 3
Repair boom type stackers.

SPECIFIC OUTCOME 4
Test the boom type stacker and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain motorised valves

SAQA US ID	*UNIT STANDARD TITLE*		
253423	Maintain motorised valves		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	4

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

SPECIFIC OUTCOME 1
Identify and discuss the applications of motorised valves.

SPECIFIC OUTCOME 2
Plan and prepare for motorised valve maintenance.

SPECIFIC OUTCOME 3
Maintain motorised valve/s.

SPECIFIC OUTCOME 4
Care for and store system maintenance tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59769	Further Education and Training Certificate: Mechanical Engineering: Pipe-Fitting	Level 4
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair a belt/chain type bucket elevator

SAQA US ID	*UNIT STANDARD TITLE*		
253424	Repair a belt/chain type bucket elevator		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing a belt/chain type bucket elevator.

SPECIFIC OUTCOME 2
Prepare to repair a belt/chain type bucket elevator.

SPECIFIC OUTCOME 3
Repair a belt/chain type bucket elevator.

SPECIFIC OUTCOME 4
Test the belt/chain type bucket elevator and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair internal combustion engines

SAQA US ID	*UNIT STANDARD TITLE*		
253425	Repair internal combustion engines		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	5

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing internal combustion engines.

SPECIFIC OUTCOME 2
Prepare to repair internal combustion engines.

SPECIFIC OUTCOME 3
Repair internal combustion engines.

SPECIFIC OUTCOME 4
Test the internal combustion engine and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace a hammer mill

SAQA US ID	*UNIT STANDARD TITLE*		
253426	Replace a hammer mill		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing a hammer mill.

SPECIFIC OUTCOME 2
Prepare to replace a hammer mill.

SPECIFIC OUTCOME 3
Replace a hammer mill.

SPECIFIC OUTCOME 4
Test the hammer mill and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair track driven earth moving equipment

SAQA US ID	*UNIT STANDARD TITLE*		
253427	Repair track driven earth moving equipment		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing track driven earth moving equipment.

SPECIFIC OUTCOME 2
Prepare to repair track driven earth moving equipment.

SPECIFIC OUTCOME 3
Repair track driven earth moving equipment.

SPECIFIC OUTCOME 4
Test the machine and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace components on an apron feeder

SAQA US ID	*UNIT STANDARD TITLE*		
253428	Replace components on an apron feeder		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing components on an apron feeder.

SPECIFIC OUTCOME 2
Prepare to replace components on an apron feeder.

SPECIFIC OUTCOME 3
Replace components on an apron feeder.

SPECIFIC OUTCOME 4
Test the apron feeder and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain filters and strainers

SAQA US ID	*UNIT STANDARD TITLE*		
253430	Maintain filters and strainers		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	4

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

SPECIFIC OUTCOME 1
Identify and discuss the applications of filters and strainers.

SPECIFIC OUTCOME 2
Plan and prepare for filter and/or strainer maintenance.

SPECIFIC OUTCOME 3
Maintain filter and/or strainer.

SPECIFIC OUTCOME 4
Care for and store system maintenance tools.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3
Elective	59750	National Certificate: Mechanical Engineering: Pipe-Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace a magnetic separator

SAQA US ID	*UNIT STANDARD TITLE*		
253431	Replace a magnetic separator		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing a magnetic separator.

SPECIFIC OUTCOME 2
Prepare to replace the magnetic separator.

SPECIFIC OUTCOME 3
Replace the magnetic separator.

SPECIFIC OUTCOME 4
Test the magnetic separator and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace components on a dragline

SAQA US ID	*UNIT STANDARD TITLE*		
253432	Replace components on a dragline		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	8

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing the components on a dragline.

SPECIFIC OUTCOME 2
Prepare to replace the component on a dragline.

SPECIFIC OUTCOME 3
Replace the components.

SPECIFIC OUTCOME 4
Test the dragline and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair bag palletisers

SAQA US ID	*UNIT STANDARD TITLE*		
253433	Repair bag palletisers		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing bag palletisers.

SPECIFIC OUTCOME 2
Prepare to repair bag palletisers.

SPECIFIC OUTCOME 3
Repair bag palletisers.

SPECIFIC OUTCOME 4
Test the bag palletiser and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain heat exchangers and pressure vessels

SAQA US ID	*UNIT STANDARD TITLE*		
253434	Maintain heat exchangers and pressure vessels		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	8

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
13278	Maintain heat exchangers and pressure vessels	Level 3	8	Will occur as soon as 253434 is registered

SPECIFIC OUTCOME 1
Identify and discuss the applications of heat exchangers and pressure vessels.

SPECIFIC OUTCOME 2
Plan and prepare for heat exchanger maintenance.

SPECIFIC OUTCOME 3
Maintain heat exchanger/s.

SPECIFIC OUTCOME 4
Care for and store system maintenance tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4
Elective	59769	Further Education and Training Certificate: Mechanical Engineering: Pipe-Fitting	Level 4
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3
Elective	59750	National Certificate: Mechanical Engineering: Pipe-Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair underground locomotives

SAQA US ID	*UNIT STANDARD TITLE*		
253435	Repair underground locomotives		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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
10759	Repair the mechanical brake system of an underground locomotive	Level 2	5	Will occur as soon as 253435 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to repairing underground locomotives.

SPECIFIC OUTCOME 2
Prepare to repair underground locomotives.

SPECIFIC OUTCOME 3
Perform maintenance on underground production machinery.

SPECIFIC OUTCOME 4
Test the underground locomotive and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace a pneumatic drill on a clay gun

SAQA US ID	*UNIT STANDARD TITLE*		
253436	Replace a pneumatic drill on a clay gun		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing a pneumatic drill on a clay gun.

SPECIFIC OUTCOME 2
Prepare to replace a pneumatic drill on a clay gun.

SPECIFIC OUTCOME 3
Replace a pneumatic drill on a clay gun.

SPECIFIC OUTCOME 4
Test the pneumatic drill and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair mechanical rock breakers

SAQA US ID	*UNIT STANDARD TITLE*		
253437	Repair mechanical rock breakers		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing rock breakers.

SPECIFIC OUTCOME 2
Prepare to repair rock breakers.

SPECIFIC OUTCOME 3
Repair rock breakers.

SPECIFIC OUTCOME 4
Test the rock breaker and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair an electro filter

SAQA US ID	*UNIT STANDARD TITLE*		
253438	Repair an electro filter		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing an electro filter.

SPECIFIC OUTCOME 2
Prepare to repair an electro filter.

SPECIFIC OUTCOME 3
Repair an electro filter.

SPECIFIC OUTCOME 4
Test the electro filter and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain valves

SAQA US ID	*UNIT STANDARD TITLE*		
253439	Maintain valves		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	8

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

SPECIFIC OUTCOME 1
Identify and discuss the applications of valves.

SPECIFIC OUTCOME 2
Plan and prepare for valve maintenance.

SPECIFIC OUTCOME 3
Maintain valve.

SPECIFIC OUTCOME 4
Care for and store system maintenance tools.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59769	Further Education and Training Certificate: Mechanical Engineering: Pipe-Fitting	Level 4
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3
Elective	59750	National Certificate: Mechanical Engineering: Pipe-Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Assemble mechanical components

SAQA US ID	*UNIT STANDARD TITLE*		
253440	Assemble mechanical components		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
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
115393	Assemble mechanical components	Level 2	12	Will occur as soon as 253440 is registered

SPECIFIC OUTCOME 1
Identify, discuss and demonstrate mechanical assembly methods and techniques.

SPECIFIC OUTCOME 2
Plan and prepare to perform a mechanical assembly.

SPECIFIC OUTCOME 3
Assemble mechanical components.

SPECIFIC OUTCOME 4
Maintain and care for tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair crushers

SAQA US ID	*UNIT STANDARD TITLE*		
253441	Repair crushers		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing crushers.

SPECIFIC OUTCOME 2
Prepare to repair crushers.

SPECIFIC OUTCOME 3
Repair crushers.

SPECIFIC OUTCOME 4
Test the crusher and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair a Rope/Hydraulic shovel

SAQA US ID	*UNIT STANDARD TITLE*		
253444	Repair a Rope/Hydraulic shovel		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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
115766	Replace dipper handles and dipper on a rope shovel	Level 2	2	Will occur as soon as 253444 is registered
115767	Replace the saddle block of a rope shovel	Level 2	2	Will occur as soon as 253444 is registered
115771	Replace hoist ropes on a rope shovel	Level 2	2	Will occur as soon as 253444 is registered
116635	Replace the side frame assembly of a hydraulic/rope shovel	Level 2	2	Will occur as soon as 253444 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to repairing a rope/hydraulic shovel.

SPECIFIC OUTCOME 2
Prepare to repair a rope/hydraulic shovel.

SPECIFIC OUTCOME 3
Repair a rope/hydraulic shovel.

SPECIFIC OUTCOME 4
Test the rope/hydraulic shovel, and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Replace components on glass lined equipment

SAQA US ID	*UNIT STANDARD TITLE*		
253363	Replace components on glass lined equipment		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to replacing components on glass lined equipment.

SPECIFIC OUTCOME 2
Prepare to replace components on glass lined equipment.

SPECIFIC OUTCOME 3
Replace components on glass lined equipment.

SPECIFIC OUTCOME 4
Test the glass lined reactor and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair an air slide

SAQA US ID	*UNIT STANDARD TITLE*		
253445	Repair an air slide		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	3

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing an air slide.

SPECIFIC OUTCOME 2
Prepare to repair an air slide.

SPECIFIC OUTCOME 3
Repair an air slide.

SPECIFIC OUTCOME 4
Test the air slide and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul pneumatic percussion drills

SAQA US ID	*UNIT STANDARD TITLE*		
253446	Overhaul pneumatic percussion drills		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling pneumatic percussion drills.

SPECIFIC OUTCOME 2
Prepare to overhaul pneumatic percussion drills.

SPECIFIC OUTCOME 3
Overhaul pneumatic percussion drills.

SPECIFIC OUTCOME 4
Test the pneumatic percussion drill and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Take samples and measurements on rotating machinery for condition monitoring purposes

SAQA US ID	*UNIT STANDARD TITLE*		
253447	Take samples and measurements on rotating machinery for condition monitoring purposes		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	5

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

SPECIFIC OUTCOME 1
Explain the factors critical to the taking of samples and measurements on rotating machinery for condition monitoring purposes.

SPECIFIC OUTCOME 2
Prepare to take samples and measurements on rotating machinery.

SPECIFIC OUTCOME 3
Take samples and measurements.

SPECIFIC OUTCOME 4
Complete the process of taking samples and measurements.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair blow tanks

SAQA US ID	*UNIT STANDARD TITLE*		
253454	Repair blow tanks		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing blow tanks.

SPECIFIC OUTCOME 2
Prepare to repair blow tanks.

SPECIFIC OUTCOME 3
Repair blow tanks.

SPECIFIC OUTCOME 4
Test the blow tank and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Install pipe hangers and supports

SAQA US ID	*UNIT STANDARD TITLE*		
253474	Install pipe hangers and supports		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Identify and discuss the applications of pipe hangers and supports.

SPECIFIC OUTCOME 2
Plan and prepare for the installation of pipe hangers and supports.

SPECIFIC OUTCOME 3
Maintain pipe hangers and supports.

SPECIFIC OUTCOME 4
Care for and store system installation tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain conveyor systems

SAQA US ID	*UNIT STANDARD TITLE*		
253475	Maintain conveyor systems		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
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
13281	Maintain conveyor systems	Level 3	6	Will occur as soon as 253475 is registered

SPECIFIC OUTCOME 1
Identify and discuss the applications of conveyor systems.

SPECIFIC OUTCOME 2
Plan and prepare for conveyor system maintenance.

SPECIFIC OUTCOME 3
Maintain conveyor system.

SPECIFIC OUTCOME 4
Care for and store system maintenance tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain compressors

SAQA US ID	*UNIT STANDARD TITLE*		
253494	Maintain compressors		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
13323	Maintain compressors	Level 3	15	Will occur as soon as 253494 is registered

SPECIFIC OUTCOME 1
Identify and discuss the applications of compressors.

SPECIFIC OUTCOME 2
Plan and prepare for compressor maintenance.

SPECIFIC OUTCOME 3
Maintain compressor.

SPECIFIC OUTCOME 4
Care for and store system maintenance tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Use and select pipe systems and pipe components

SAQA US ID	*UNIT STANDARD TITLE*		
253495	Use and select pipe systems and pipe components		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Identify and discuss pipe systems and related components.

SPECIFIC OUTCOME 2
Interpret pipe specifications.

SPECIFIC OUTCOME 3
Read and interpret flow diagrams.

SPECIFIC OUTCOME 4
Store pipes and pipe assemblies.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Cut screw threads and install threaded pipe systems

SAQA US ID	*UNIT STANDARD TITLE*		
253496	Cut screw threads and install threaded pipe systems		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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
10786	Cut screw threads by means of a thread-cutting machine	Level 2	2	Will occur as soon as 253496 is registered

SPECIFIC OUTCOME 1
Discuss threaded pipe fittings and the thread cutting process.

SPECIFIC OUTCOME 2
Explain the application of the thread cutting machine and prepare to cut screw threads.

SPECIFIC OUTCOME 3
Cut screw threads by means of a thread-cutting machine.

SPECIFIC OUTCOME 4
Install screwed or threaded pipes and pipe fittings.

SPECIFIC OUTCOME 5
Care and store tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Maintain positive displacement pumps

SAQA US ID	*UNIT STANDARD TITLE*		
253497	Maintain positive displacement pumps		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
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
13276	Maintain pumps	Level 3	24	Will occur as soon as 253497 is registered

SPECIFIC OUTCOME 1
Identify and discuss the applications of positive displacement pumps.

SPECIFIC OUTCOME 2
Plan and prepare for positive displacement pump maintenance.

SPECIFIC OUTCOME 3
Maintain a positive displacement pump.

SPECIFIC OUTCOME 4
Care for and store tools and equipment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair a rotary drill

SAQA US ID	*UNIT STANDARD TITLE*		
253514	Repair a rotary drill		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing a rotary drill.

SPECIFIC OUTCOME 2
Prepare to repair a rotary drill.

SPECIFIC OUTCOME 3
Repair a rotary drill.

SPECIFIC OUTCOME 4
Test the rotary drill and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair air driven track bound mechanical loaders

SAQA US ID	*UNIT STANDARD TITLE*		
253534	Repair air driven track bound mechanical loaders		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing air driven track bound mechanical loaders.

SPECIFIC OUTCOME 2
Prepare to repair air driven track bound mechanical loaders.

SPECIFIC OUTCOME 3
Repair air driven track bound mechanical loaders.

SPECIFIC OUTCOME 4
Test the air driven track bound mechanical loader and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair mono rope winches

SAQA US ID	*UNIT STANDARD TITLE*		
253535	Repair mono rope winches		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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
10833	Repair a monorope winch	Level 2	3	Will occur as soon as 253535 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to repairing mono rope winches.

SPECIFIC OUTCOME 2
Prepare to repair mono rope winches.

SPECIFIC OUTCOME 3
Repair mono rope winches.

SPECIFIC OUTCOME 4
Test the mono rope winch and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul a pneumatic percussion drill

SAQA US ID	*UNIT STANDARD TITLE*		
253536	Overhaul a pneumatic percussion drill		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling a pneumatic percussion drill.

SPECIFIC OUTCOME 2
Prepare to overhaul a pneumatic percussion drill.

SPECIFIC OUTCOME 3
Overhaul a pneumatic percussion drill.

SPECIFIC OUTCOME 4
Test a pneumatic percussion drill and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul the bogey of rolling stock

SAQA US ID	*UNIT STANDARD TITLE*		
253537	Overhaul the bogey of rolling stock		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling the bogey of rolling stock.

SPECIFIC OUTCOME 2
Prepare to overhaul the bogey.

SPECIFIC OUTCOME 3
Overhaul the bogey.

SPECIFIC OUTCOME 4
Complete the overhauling process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair rail tracks

SAQA US ID	*UNIT STANDARD TITLE*		
253874	Repair rail tracks		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing rail tracks.

SPECIFIC OUTCOME 2
Prepare to repair the rail tracks.

SPECIFIC OUTCOME 3
Repair the rail tracks.

SPECIFIC OUTCOME 4
Test the rail tracks and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59669	National Certificate: Mechanical Engineering: Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Inspect and conduct routine maintenance on an overhead crane

SAQA US ID	*UNIT STANDARD TITLE*		
254355	Inspect and conduct routine maintenance on an overhead crane		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	2

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

SPECIFIC OUTCOME 1
Explain the factors critical to inspecting and maintaining an overhead crane.

SPECIFIC OUTCOME 2
Prepare to inspect and maintain the overhead crane.

SPECIFIC OUTCOME 3
Inspect and maintain the overhead crane.

SPECIFIC OUTCOME 4
Complete the inspection and maintenance process and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59709	Further Education and Training Certificate: Mechanical Engineering: Fitting	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair a drum stacker

SAQA US ID	*UNIT STANDARD TITLE*		
254356	Repair a drum stacker		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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
10765	Repair a drum stacker	Level 2	5	Will occur as soon as 254356 is registered

SPECIFIC OUTCOME 1
Test the drum stacker and prepare for operation and/or production.

SPECIFIC OUTCOME 2
Repair the drum stacker.

SPECIFIC OUTCOME 3
Prepare to repair the drum stacker.

SPECIFIC OUTCOME 4
Explain the factors critical to repairing drum stackers.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Bend a pipe by means of a hydraulic pipe bender

SAQA US ID	*UNIT STANDARD TITLE*		
254357	Bend a pipe by means of a hydraulic pipe bender		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
10824	Bend a pipe by means of a hydraulic pipe bender	Level 2	2	Will occur as soon as 254357 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to bending pipes by means of a hydraulic pipe bender.

SPECIFIC OUTCOME 2
Prepare to bend a pipe by means of a hydraulic pipe bender.

SPECIFIC OUTCOME 3
Bend a pipe by means of a hydraulic pipe bender.

SPECIFIC OUTCOME 4
Complete the pipe bending process and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	59689	National Certificate: Mechanical Engineering: Fitting	Level 2
Elective	59750	National Certificate: Mechanical Engineering: Pipe-Fitting	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul hydraulic equipment components

SAQA US ID	*UNIT STANDARD TITLE*		
253381	Overhaul hydraulic equipment components		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	5

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

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling hydraulic equipment components.

SPECIFIC OUTCOME 2
Prepare to overhaul pumps.

SPECIFIC OUTCOME 3
Overhaul the hydraulic equipment components.

SPECIFIC OUTCOME 4
Test the hydraulic equipment components and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Overhaul a reduction gearbox

SAQA US ID	*UNIT STANDARD TITLE*		
253389	Overhaul a reduction gearbox		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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
10752	Overhaul a reduction gearbox	Level 2	5	Will occur as soon as 253389 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to overhauling reduction gearboxes.

SPECIFIC OUTCOME 2
Prepare to overhaul a reduction gearbox.

SPECIFIC OUTCOME 3
Overhaul the reduction gearbox.

SPECIFIC OUTCOME 4
Test the reduction gearbox and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair reclaimers

SAQA US ID	*UNIT STANDARD TITLE*		
253429	Repair reclaimers		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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
10764	Repair a drum reclaimer	Level 2	5	Will occur as soon as 253429 is registered

SPECIFIC OUTCOME 1
Explain the factors critical to the repair of drum/boom reclaimer.

SPECIFIC OUTCOME 2
Prepare to repair the drum/boom reclaimer.

SPECIFIC OUTCOME 3
Repair the drum/boom reclaimer.

SPECIFIC OUTCOME 4
Test the drum/boom reclaimer and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Perform maintenance on underground production machinery

SAQA US ID	*UNIT STANDARD TITLE*		
253442	Perform maintenance on underground production machinery		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	11

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

SPECIFIC OUTCOME 1
Explain the factors critical to performing maintenance on underground production machinery.

SPECIFIC OUTCOME 2
Prepare to perform maintenance on underground production machinery.

SPECIFIC OUTCOME 3
Perform maintenance on underground production machinery.

SPECIFIC OUTCOME 4
Test the machine and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Take samples and measurements on machinery for condition monitoring purposes

SAQA US ID	*UNIT STANDARD TITLE*		
253443	Take samples and measurements on machinery for condition monitoring purposes		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1
Explain the factors critical to taking samples and measurements on machinery for condition monitoring purposes.

SPECIFIC OUTCOME 2
Prepare to take samples and measurements on machinery.

SPECIFIC OUTCOME 3
Take samples and measurements on machinery.

SPECIFIC OUTCOME 4
Complete the process of taking samples and measurements.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Repair pumps

SAQA US ID	*UNIT STANDARD TITLE*		
253476	Repair pumps		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering& Technology			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	9

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

SPECIFIC OUTCOME 1
Explain the factors critical to repairing pumps.

SPECIFIC OUTCOME 2
Prepare to repair the pump.

SPECIFIC OUTCOME 3
Repair the pump.

SPECIFIC OUTCOME 4
Test the pump, and prepare for operation and/or production.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None