No. 596 **13 July 2007**

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 Qualification and Unit Standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the Qualification and Unit Standards. The full Qualification and Unit Standards can be accessed via the SAQA web-site at **www.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 Qualification and Unit Standards should reach SAQA at the address below and ***no later than 13 August 2007.*** 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: Engineering Fabrication

SAQA QUAL ID	*QUALIFICATION TITLE*		
58722	National Certificate: Engineering Fabrication		
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	148	Level 2	Regular-Unit Stds Based

PURPOSE OF THE QUALIFICATION
Purpose:

Engineering Fabrication is a generic engineering and trade related qualification that builds the foundational knowledge and skills required by learners involved in Engineering Fabrication. This qualification is designed to meet the needs of the Learner in a variety of engineering related sectors.

The NC: Engineering Fabrication shall develop learners to produce simple (uncomplicated) metal components using a variety of fabrication methods. This capability requires an understanding of basic fabrication theory; machinery functioning, operation and maintenance; engineering materials and tools; concepts of measurement; basic engineering drawing and development of components and simple (uncomplicated) methods of cutting and joining metals. The metal components that the qualified person fabricates will be vital for the maintenance and reliable operation of equipment and machinery in a variety of industries.

The qualification adds value to the qualifying learner in terms of enrichment of the person, recognition, and contributes towards the achievement of "artisan" status or other accepted progression route.

The qualification is structured in such a way that it exposes learners to generic and specific competencies required in the Engineering Fabrication industries. This qualification makes provision for engineering fabrication to be applied within the following sectors:

- Mining and Minerals sector.
- Chemical sector.
- Transport sector.
- Manufacturing sector.
- Other engineering related sectors.

Qualifying learners will be able to do the following:

- Demonstrate an understanding of a variety of engineering fabrication methods.
- Produce simple metal components.
- Use and maintain engineering hand and power tools.
- Adhere to Occupational Health, Safety and Environmental requirements.

• Communicate effectively in order to achieve personal, business and organisational objectives.

Qualifying learners will also understand:

• The basics of how a business functions, and the role of the qualified learner in the business, i.e. fabrication and related activities.
• How the learning achieved whilst obtaining this qualification relates to the learning required in other similar qualifications.
• The importance of communication in achieving goals.
• How they are affected by legislation, regulations, agreements and policies related to their particular work environment.

With this understanding, learners will be able to participate effectively in workplace activities.

Rationale:

Engineering Fabrication, in the context of this qualification is the designing and making of metal components that are required within various industry sectors. The main focus is on the laying out and manipulation of low carbon metal (sheet metal, plate, sections and pipe) to produce usable components.

Most industries are dependant on the fabrication of metal components. Examples of this may be the ship building industry (plates and welding), the chemical industry (pipes and welding) and/or the mining and minerals industry (plate and pipes and welding). It is evident that each peculiar industry may use different nomenclature.

Due to the nature of the collaborative approach to designing this qualification, access, progression, transferability of competence and mobility of the learner within and between sectors is more feasible. Certain components of learning within this qualification may have pertinence within other learning fields such as fitting, electro-mechanical, automotive etc. This will predominantly be in the area of welding and fuel cutting and welding equipment.

This qualification is intended for persons that wish to enter a career in the fabrication industry. The learner achieving this qualification will be more employable within a broad industry context, and will thus be a contributing factor to the economy of the relevant organisation and the country. The learner will benefit from obtaining this qualification due to the fact that industry has a need for persons with fabrication competencies. Competent persons will be responsible for fabricating and maintaining industry related equipment and machinery.

This qualification focuses on developing skills and knowledge necessary to ensure optimal productivity in the Mining and Minerals Industry; Chemical; Petro-chemical; Metal, Engineering and other related industries. This qualification is intended to replace the (currently de-registered) National Certificate: Fabrication Level 2.

As this qualification forms the basis for further learning in the field of engineering fabrication, where the learner will be able to specialise in one of the Fabrication or Welding skills areas, it is accepted that the learner may exit (and be employed at this level (Level 2)), or continue further learning toward obtaining the next level qualification.

The learner may also choose to learn towards achievement in other fields as the learning in the fundamental and core component of this qualification lends itself to lateral as well as vertical exploitation. This qualification enables learners who have gained relevant experience in the workplace to gain credits through the RPL process.

RECOGNIZE PREVIOUS LEARNING?
Y

LEARNING ASSUMED IN PLACE

In order that the learner may progress at a desired rate whilst learning towards this qualification, It is assumed that learners are already competent in or have an equivalent of:

- Communication and Mathematical Literacy at NQF Level 1.

Recognition of Prior Learning:

This qualification can be achieved wholly or in part through recognition of prior learning in terms of the criteria laid out above.

Evidence can be presented in a variety of forms, including international or previous local qualifications, reports, testimonials mentioning functions performed, work records, portfolios, videos of practice and performance records.

Access to the qualification:

Access to this qualification is open. However, it is preferable that learners have completed a relevant industry related General Education and Training intervention at NQF Level 1.

QUALIFICATION RULES

To achieve this qualification the learner must achieve a minimum of 158 Credits.

The learner must achieve the Fundamental, Core and Elective learning components of this qualification as follows:

Fundamental:

- Learners wishing to achieve this qualification must successfully complete all the listed fundamental unit standards with a total credit value of 36 credits.

Core:

- Learners wishing to achieve this qualification must successfully complete all the listed core unit standards with a total credit value of 100 credits.

Elective:

- Learners wishing to achieve this qualification must successfully obtain a minimum of 12 credits from the list of elective unit standards, and preferably from those that reflect their specific industry needs.

EXIT LEVEL OUTCOMES

1. Demonstrate an understanding of a range of relevant engineering fabrication methods.

2. Produce simple components that meet quality and output requirements.

3. Adhere to Occupational Health, Safety and Environmental requirements.

4. Communicate effectively in order to achieve personal, business and organisational objectives.

Critical Cross-Field Outcomes.

In accordance with SAQA guidelines, all unit standards include the assessment of relevant critical cross-field outcomes. Consequently, Exit Level Outcomes are consistent with critical cross-field outcome requirements.

The following CCFO's have been addressed in this qualification as per the unit standards outlined in the Annexures:

Identifying and solving problems in which responses display that responsible decisions using critical thinking have been made
- Evident in Exit Level Outcomes 1, 2, 3, 4.

Working effectively with others as a member of a team, group, organisation and community
- Evident in Exit Level Outcomes 2, 3, 4.

Organising and managing oneself and one's activities responsibly and effectively
- Evident in Exit Level Outcomes 1, 2, 3, 4.

Collecting, analysing, organising and critically evaluating information
- Evident in Exit Level Outcomes 1, 2, 3, 4.

Communicating effectively using visual, mathematical and/or language skills
- Evident in Exit Level Outcomes 1, 2, 3, 4.

Using science and technology effectively and critically, showing responsibility toward the environment and health of others
- Evident in Exit Level Outcomes 1, 2.

Demonstrating an understanding of the world as a set of related systems by recognising that problem contexts do not exist in isolation
- Evident in Exit Level Outcomes 3, 4.

Contributing to the full personal development of each learner and the social and economic development of society at large, by making it an underlying intention of the programme of learning to make an individual aware of:
- Reflecting on and exploring a variety of strategies to learn more effectively.
- Participating as responsible citizens in the life of local, national and global communities.
- Being culturally and aesthetically sensitive across a range of contexts.
- Exploring education and career opportunities.
- Developing entrepreneurial opportunities.

(Evident in Exit Level Outcomes 1, 2, 3, 4.)

ASSOCIATED ASSESSMENT CRITERIA

Associated Assessment Criteria for Exit Level Outcome 1:

- Engineering principles are explained relative to engineering fabrication.
- Fabrication methods that are appropriate are identified and applied when fabricating simple metal components.
- Mathematical principles and techniques are applied to determine calculations and measurement values used in an engineering fabrication process.

Associated Assessment Criteria for Exit Level Outcome 2:

- Basic Engineering drawings are read in accordance with work instructions.

• Relevant measuring equipment, and engineering tools are selected and used to perform marking off procedures, shape and form sheet metal components and to cut drill and punch steel components according to specified requirements.
o Range: Engineering tools include hand and power tools.
• Oxy-fuel gas cutting equipment is operated to fabricate and assemble steel components.
• Work-pieces are joined and assembled using appropriate shielded metal arc Welding equipment and processes.
• Record keeping is explained and applied in accordance with specified quality requirements.

Associated Assessment Criteria for Exit Level Outcome 3:

• Occupational health, safety and environmental legislation is understood in order to apply specific safety practices and procedures relevant to the engineering fabrication industry.
• Output and quality requirements are described/explained and met in accordance with occupational health, safety and environmental standards (including job specifications).
• Consequences of non compliance are explained.

Associated Assessment Criteria for Exit Level Outcome 4:

• The purpose of the organisation is described in terms of achieving specific objectives.
• Communication techniques within the engineering fabrication workplace are explained and demonstrated in accordance with specified requirements.
o Range: Communication Techniques include verbal and written instructions.
• Relationships with peers are maintained to promote effective communication within the workplace.
• Engineering Fabrication related information is interpreted and conveyed in accordance with organisational work requirements.

Integrated Assessment.

Integrated assessment at the level of the qualification provides an opportunity for learners to show they are able to integrate concepts, actions and ideas achieved across a range of unit standards and contexts.

Integrated assessment must evaluate the quality of observable performance as well as the thinking behind the performance, and must be based on a summative assessment guide. The guide will spell out how the assessor will assess different aspects of the performance and will include:

• Observing the learner at work (both in the primary activity as well as other interactions).
• Asking questions and initiating short discussions to test understanding.
• Looking at records and reports in the portfolio and reviewing previous assessments.

In some cases inference will be necessary to determine competence depending on the nature and context within which performance takes place.

It is necessary to ensure that the fundamental part of the qualification is also targeted to ensure that while the competence may have been achieved in a particular context, learners are able to apply it in a range of other contexts and for further learning. The assessment should also ensure that all the critical cross-field outcomes have been achieved.

The learner may choose in which language s/he wants to be assessed. This should be established as part of a process of preparing the learner for assessment and familiarising the learner with the approach being taken.

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. The assessment process should cover both the explicit tasks required for the qualification as well as the understanding of the concepts and principles that underpin the activities associated with the engineering fabrication process.

INTERNATIONAL COMPARABILITY

This qualification arises from the need within South Africa to rationalise the Qualifications Framework. The traditional qualifications such as Plater Welder, Plater Boilermaker, Boilermaker, etc were mostly similar in content and intent. In order to arrive at a meaningful and acceptable nomenclature for the qualification series, it was decided to use "Fabrication" as a description of the type of activity for this qualification.

This in itself presented a problem when attempting to do a comparison of qualifications, nationally and internationally. The problem is that the colloquial understanding of the term "Fabrication" is very broad. Many qualifications and outcomes are available as comparison, but none precisely in the context of what we (South African Industry) need.

The plastic forming industries, as well as the wood and furniture type industries use "fabrication" as their activity description. Also, certain industries have fabrication as a very limited and specialist activity viz. air-conditioning ducting. This made the International Comparability research more difficult and complex.

It must be stated from the outset of this statement that reference to international benchmarking for this qualification, applies only to the education and training content at specific levels between NQF Level 2, NQF Level 3 and NQF Level 4 and its measure of "appropriateness" when compared with fabrication training programs internationally. It was not possible to assimilate operational applicability as contexts are too various and wide.

African countries with manufacturing and engineering infrastructure (including SADC countries) were scanned for applicable qualifications or training programs, but no relevant information regarding the delivery of qualifications in any of these countries was available.

Despite exhaustive information searches for information regarding fabrication qualification in Germany and Korea. It was apparent that a similar problem of specialisation as opposed to generalisation existed. Some interesting information is contained in a document by Derek King of Liverpool Community College. This can be viewed at the following website: http://www2.trainingvillage.gr/download/journal/bull-22/22-en.html.

Further research in International comparability, including similar qualification structures and progressions from NQF Level 2 to NQF Level 3 resulted in the following:

United Kingdom:

The United Kingdom has a longstanding international reputation in the metal manufacturing and fabrication industry. It is due to this reputation that it is deemed prudent to use the United Kingdom as a benchmark for South African Fabrication Qualifications.

Fabrication and Welding Engineering NQF Level 2 (NVQ: 100/3611/8-SVQ: G7E022): http://www.tsw.co.uk/tsw/uploaded_files/Fabrication%20&%20Welding%20Engineering%20level%202.pdf.

The competencies listed in this qualification are as below:

Assess Route; Unit Title:

- FWE2/001; Complying with Statutory Regulations and Organisational Safety Requirements.
- FWE2/002; Using and Interpreting Engineering Data and Documentation.
- FWE2/003; Working Efficiently and Effectively in Engineering.
- FWE2/004; Joining Materials by the Manual Metal Arc Welding Process.
- FWE2/005; Joining Materials by Manual MIG/MAG and other Continuous Wire.
- FWE2/006; Joining materials by Manual TIG and Plasma-arc Welding Processes.
- FWE2/007; Joining Materials by the Manual Gas Welding Process.
- FWE2/008; Producing Fillet Welded Joints using a Manual Welding Process.
- FWE2/009; Welding Materials with Mechanised Arc Welding Equipment.
- FWE2/010; Welding Materials using Resistance Spot, Seam and Projection Welding Machines.
- FWE2/011; Welding Materials using Laser Welding Machines.
- FWE2/012; Welding Materials using Electron Beam Welding Machines.
- FWE2/013; Welding Materials using Friction Welding Machines.
- FWE2/014; Joining Rails using the Aluminothermy Welding Process.
- FWE2/015; Restore Rails to Operational Condition using an Arc Welding Process.
- FWE2/016; Welding Rails using Flash Welding Equipment.
- FWE2/017; Joining Materials by Manual Torch Brazing and Soldering.
- FWE2/018; Joining Materials by Manual Torch Brazing Machines.
- FWE2/021; Marking Out Components for Fabrication.
- FWE2/022; Cutting Sheet Metal to Shape using Hand and Machine Tools.
- FWE2/023; Forming Sheet Metal using Hand and Machine tools.
- FWE2/024; Producing Sheet Metal Assemblies.
- FWE2/025; Heat Treating Materials for Fabrication Activities.
- FWE2/026; Cutting and Shaping Materials using NC/CNC Laser Profiling Machines.
- FWE2/027; Cutting and Shaping using NC/CNC Plasma or Gas Cutting Machines.
- FWE2/028; Assembling Components using Mechanical Fasteners.
- FWE2/029; Bonding Engineering Materials using Adhesives.
- FWE2/030; Joining Materials by Resistance Spot Welding.
- FWE2/031; Slinging, Lifting and Moving Materials and Components.
- FWE2/032; Cutting Plate and Sections using Shearing Machines.
- FWE2/033; Cutting Materials using Hand Operated Thermal Cutting Equipment.
- FWE2/034; Cutting and Shaping Materials using Gas Cutting Machines.
- FWE2/035; Cutting Materials using Saws and Abrasive Discs.
- FWE2/036; Bending and Forming Plate using Power Operated Machines.
- FWE2/037; Forming Plate work using Power Rolling Machines.
- FWE2/038; Producing Plate work Assemblies.
- FWE2/039; Producing Holes using Drilling Machines.
- FWE2/040; Forming of Structural Sections using Machines.
- FWE2/041; Producing Structural Metal Ancillary Components.
- FWE2/042; Assembling Structural Metalwork.
- FWE2/043; Forming Pipe work by Machine Bending.
- FWE2/044; Producing Socket and Flange Fillet Welded Joints in Pipe using a Manual Welding Process.
- FWE2/045; Producing Composite Mouldings using Wet Lay-up Techniques.
- FWE2/046; Producing Composite Mouldings using Pre-Preg Laminating Techniques.
- FWE2/047; Producing Components by Acrylic Moulding.
- FWE2/048; Vacuum Forming Composite Materials.
- FWE2/049; Trimming Composite Mouldings using Hand Tools.
- FWE2/050; Identifying Defects in Composite Mouldings.
- FWE2/051; Applying Surface Finishes to Composite Mouldings.
- FWE2/052; Bonding Composite Mouldings.
- FWE2/053; Producing Composite Assemblies.

National Vocational Qualifications are achieved through training and assessment. Assessment is normally through on-the-job observation and questioning. Candidates produce evidence to prove they have the competence to meet the NVQ standards. Assessors 'sign-off' units when the candidates are ready the assessor tests candidates' underpinning knowledge, understanding and work-based performance to make sure they can demonstrate competence in the workplace. This process is fully compatible and comparable with the South African process.

The elective component is largely outside the peculiar specialisation areas as required in South Africa. It is not evident what the credit value for this qualification is.

New Zealand:

Two separate qualifications were found. There is some similarity in the content of both but the reason why they were separately developed is not evident.

National Certificates in New Zealand are achieved through training and assessment. Assessment is normally through on-the-job observation and other evidence gathering techniques. Candidates provide evidence to prove they have the competence to meet the NZQA standards. Assessors test candidates' underpinning knowledge, understanding and work-based performance to make sure they can demonstrate competence in the workplace.

This process is fully compatible and comparable with the South African process with the exception that New Zealand has some unit standards with the requirement of being performed "under supervision". This is contrary to outcomes based learning and development principles. It is also difficult to think it feasible that level 2 will be a legitimate exit level qualification.

National Certificate in Mechanical Engineering (NQF Level 2) Reference 1220: http://www.nzqa.govt.nz/nqfdocs/quals/doc/1220.doc.

The credit value for the qualification National Certificate in Mechanical Engineering (NQF Level 2) is 60.

The competencies listed in this qualification are as below:

Unit Number; Unit Standard Title; Level; Credit:

- 20799; Demonstrate basic knowledge of engineering metals; Level 2; 4 Credits.
- 20917; Demonstrate basic knowledge of engineering materials; Level 2; 2 Credit.
- 4433; Select, use, and care for simple measuring devices used in engineering; Level 1; 2 Credits.
- 4435; Select, use, and care for engineering dimensional measuring equipment; Level 2; 3 Credits.
- 4436; Select, use, and care for engineering marking-out equipment; Level 2; 4 Credits.
- 2395; Select, use and care for, engineering hand tools; Level 2; 4 Credits.
- 2396; Select, use and maintain portable hand held engineering power tools; Level 2; 4 Credits.
- 21905; Demonstrate knowledge of trade calculations and units for mechanical engineering trades; Level 2; 4 Credits.
- 21906; Perform basic mechanical engineering machining operations under supervision; Level 2; 12 Credits.
- 21908; Demonstrate knowledge of basic mechanics for mechanical engineering trades; Level 2; 2 Credits.
- 21909; Demonstrate knowledge of fasteners used in mechanical engineering; Level 2; 1 Credits.
- 21911; Demonstrate knowledge of safety on engineering worksites; Level 2; 1 Credits.

• 21913; Shift loads in engineering installation, maintenance, and fabrication work; Level 2; 2 Credits.
• 2430; Draw and interpret engineering sketches under supervision; Level 2; 4 Credits.
• 2432; Construct engineering plane geometric shapes under supervision; Level 2; 3 Credits.
• 2387; Assemble mechanical components under supervision; Level 2; 2 Credits.
• 21907; Demonstrate and apply knowledge of safe welding procedures under supervision; Level 2; 3 Credits.
• 6401; Provide first aid; Level 2; 1 Credits.
• 6402; Provide resuscitation Level 2; 1; 1 Credits.
• 497; Protect health and safety in the workplace; Level 1; 1 Credits.

National Certificate in Engineering (General Engineering-Mechanical) (NQF Level 2) Reference: 0903: http://www.nzqa.govt.nz/nqfdocs/quals/doc/0903.doc.

The credit value for the qualification National Certificate in Engineering (General Engineering-Mechanical) (NQF Level 2) is 77.

The competencies listed in this qualification are as below:

Unit Number; Unit Standard Title; Level; Credit:

• 4795; Distinguish the characteristics of engineering materials; Level 1; 2 Credits.
• 4796; Distinguish the characteristics of engineering metals; Level 2; 3 Credits.
• 4432; Identify and convert basic units of measure used in engineering; Level 1; 1 Credits.
• 4433; Measure with non-complex devices used in engineering; Level 1; 2 Credits.
• 4435; Select, use and care for engineering dimensional measuring equipment; Level 2; 3 Credits.
• 4795; Distinguish the characteristics of engineering materials; Level 1; 2 Credits.
• 4796; Distinguish the characteristics of engineering metals; Level 2; 3 Credits.
• 4432; Identify and convert basic units of measure used in engineering; Level 1; 1 Credits.
• 4433; Measure with non-complex devices used in engineering; Level 1; 2 Credits.
• 4435; Select, use and care for engineering dimensional measuring equipment; Level 2; 3 Credits.
• 4436; Select, use and care for engineering marking-out equipment; Level 2; 4 Credits.
• 2395; Select, use, and care for engineering hand tools; Level 1; 4 Credits.
• 2396; Select, use, and maintain portable hand held engineering power tools; Level 2; 4 Credits.
• 2824; Follow safe working practices on an engineering worksite; Level 2; 3 Credits.
• 2430; Draw and interpret engineering sketches under supervision; Level 2; 4 Credits.
• 2431; Draw and interpret engineering drawings under supervision; Level 2; 8 Credits.
• 2432; Construct engineering plane geometric shapes; Level 2; 3 Credits.
• 2414; Lay out and mark off regular fabrication shapes under supervision; Level 2; 15 Credits.
• 2415; Form and shape fabrication materials under supervision; Level 2; 10 Credits.
• 2416; Assemble and mechanically join plate and sheet under supervision; Level 2; 10 Credits.
• 2417; Mechanically cut fabrication materials under supervision; Level 2; 8 Credits.
• 16954; Calculate lengths, areas and mass of engineering fabrication materials; Level 2; 4 Credits.
• 16955; Calculate sizes, mass, volumes, and quantities for engineering fabrication; Level 3; 4 Credits.
• 2701; Produce components by performing reciprocating cutting operations; Level 2; 10 Credits.
• 11661; Produce components by performing general engineering drilling operations; Level 2; 5 Credits.
• 11662; Produce components by performing general engineering turning operations; Level 2; 12 Credits.

• 11663; Produce components by performing general engineering milling operations; Level 2; 12 Credits.
• 11664; Produce components by performing general engineering surface grinding operations; Level 2; 3 Credits.
• 2722; Maintain a fluid power system; Level 2; 5 Credits.
• 2723; Make a fluid power system safe; Level 2; 8 Credits.
• 2724; Clean a fluid power system for service; Level 2; 4 Credits.
• 17344; Draw a diagram, and explain the operating principles, of a simple pneumatic power system; Level 2; 3 Credits.
• 17345; Draw a diagram, and explain the operating principles, of a simple hydraulic power system; Level 2; 3 Credits.
• 2397; Service machines and equipment; Level 2; 4 Credits.
• 2398; Monitor, under supervision, the condition of machinery and equipment; Level 3; 4 Credits.
• 2401; Shut down and isolate machines and equipment; Level 3; 3 Credits.
• 2670; Avoid welding hazards with safe work practices; Level 2; 1 Credits.
• 2672; Weld metal to a general purpose industry standard with the gas metal arc welding process; Level 3; 6 Credits.
• 2676; Weld stainless metal sheet with the gas tungsten arc welding process; Level 3; 6 Credits.
• 2678; Join metals with the oxyacetylene welding process; Level 3; 6 Credits.
• 2682; Weld metal to a general purpose industry standard with the manual metal arc welding process; Level 3; 6 Credits.
• 2683; Cut metals using manual thermal processes; Level 3; 4 Credits.

Australia:

Two separate qualifications were noted and included in the research. The NQF Level 1 Qualification complements the NQF Level two Qualification and it is prudent to recognise both together.

Following the Australian Prime Minister's announcement, the responsibilities and functions of the Australian National Training Authority (ANTA) have been transferred to the Department of Education, Science and Training (DEST).

Certificates in Australia are achieved through training and assessment. Assessment is through training provider and on-the-job observation and other evidence gathering techniques. Candidates provide evidence to prove they have the competence to meet the DEST standards. Assessors test candidates' underpinning knowledge, understanding and work-based performance confirm they can demonstrate competence in the workplace. This process is fully compatible and comparable with the South African process.

Certificate I in Engineering (NQF Level 1) (MEM10105).
http://www.qsa.qld.edu.au/memos/06/071-06.pdf.

Unit Code; Unit title; Points:

• MEM13.14A; Apply principles of occupational health and safety in the work environment.
• MEM14.4A; Plan to undertake a routine task.
• MEM15.24A; Apply quality procedures.
• MEM16.7A; Work with others in a manufacturing, engineering or related environment.
• MEM5.4C; Perform routine oxy acetylene welding; 2.
• MEM5.5B; Carry out mechanical cutting; 2.
• MEM5.6B; Perform brazing and/or silver soldering; 2.
• MEM5.7C; Perform manual heating and thermal cutting; 2.
• MEM5.12C; Perform routine manual metal arc welding; 2.

- MEM7.32B; Use workshop machines for basic operations; 2.
- MEM11.11B; Undertake manual handling; 2.
- MEM12.23A; Perform engineering measurements; 5.
- MEM12.24A; Perform computations; 3.
- MEM16.8A; Interact with computing technology; 2.
- MEM18.1C; Use hand tools; 2.
- MEM18.2B; Use power tools/hand held operations; 2.

Certificate II in Engineering: Production Engineering (NQF Level 2) (MEM20205) does not compare well with the requirements or context of this comparison.

It appears that this comparison indicates that there are no commensurate qualifications that compare well with the generic nature of the SAQA National Certificate Fabrication (NQF Level 2). However, the Certificate III in Engineering - Fabrication Trade (Apprenticeship) will appear to satisfy the comparison in terms of a combined qualification attainment. This means that the SAQA NQF Level 2 and NQF Level 3 (combined) may be seen to be fair comparison. As an illustration of this, the Australian "NQF Level 3" qualification is indicated below.

It is also apparent that different measuring mechanisms are used. One qualification uses the point process and another uses the hour/credits process. Unlike the consistent SAQA process of measurement, this may lead to confusion.

Certificate III in Engineering: Fabrication Trade (Apprenticeship):
http://www.nmit.vic.edu.au/courses/manufacturing/fab_cer3_app_a.html#top.

Unit Code; Unit title; Hours:

- MEM12.23A; Perform engineering measurements; 50 hrs.
- MEM12.24A; Perform computations; 30 hrs.
- MEM13.14A; Apply principles of occupational health and safety in the work environment.
- MEM14.4A; Plan to undertake a routine task.
- MEM14.5A; Plan a complete activity; 40 hrs.
- MEM15.2A; Apply quality systems; 20 hrs.
- MEM15.24A; Apply quality procedures.
- MEM16.6A; Organise and communicate information; 20 hrs.
- MEM16.7A; Work with others in a manufacturing, engineering or related environment.
- MEM16.8A; Interact with computing technology; 20 hrs.
- MEM17.3A; Assist in the provision of on the job training; 20 hrs.
- MEM5.4C; Perform routine oxy acetylene welding; 20 hrs.
- MEM5.5B; Carry out mechanical cutting; 20 hrs.
- MEM5.7C; Perform manual heating and thermal cutting; 20 hrs.
- MEM5.10B; Apply fabrication, forming and shaping techniques; 80 hrs.
- MEM5.11C; Assemble fabricated components; 80 hrs.
- MEM5.12C; Perform routine manual metal arc welding; 20 hrs.
- MEM5.15C; Weld using manual metal arc welding process; 40 hrs.
- MEM5.17C; Weld using gas metal arc welding process; 40 hrs.
- MEM5.19C; Weld using gas tungsten arc welding process; 40 hrs.
- MEM5.36C; Repair/replace/modify fabrications; 40 hrs.
- MEM5.37B; Perform geometric development; 60 hrs.
- MEM5.38B; Perform advanced geometric developmen-cylindrical/rectangular; 20 hrs.
- MEM5.39B; Perform advanced geometric development-conical; 20 hrs.
- MEM5.40B; Perform advanced geometric development-transitions; 40 hrs.
- MEM5.49B; Perform routine gas tungsten arc welding; 20 hrs.
- MEM5.50B; Perform routine gas metal arc welding; 20 hrs.
- MEM5.51A; Select welding processes; 20 hrs.

- MEM5.52A; Apply safe welding practices; 40 hrs.
- MEM8.10B; Manually finish/polish materials; 60 hrs.
- MEM9.2B; Interpret technical drawing; 40 hrs.
- MEM12.7C; Mark off/out structural fabrications and shapes; 40 hrs.
- MEM18.1C; Use hand tools; 20 hrs.
- MEM18.2B; Use power tools/hand held operations; 20 hrs.
- MEM7.32B; Use workshop machines for basic operations; 20 hrs.
- MEM11.11B; Undertake manual handling; 20 hrs.
- MEM30.12A; Apply mathematical techniques in a manufacturing, engineering or related environment; 40 hrs.

A direct comparison with these international qualifications indicates that the education and training focus of all the qualifications is basically the same. However, the basic construct differs in that the nomenclature is dissimilar to that used in South Africa. One has to draw the conclusion of comparison as follows:

- In Australia the Mandatory Units of Learning may be what we see as Fundamental. This is due to the fact that no technical related units of learning appear in this section. There is a distinct lack of core and elective components in the Australian model as the only other section of the qualification is termed Specialisation Units. In South Africa we may call this the Elective component.

- This Qualification compares well with the international qualifications and training programs offered. The specific operational content (elective component) incorporated in the qualification will serve to enable qualifying learners to make better informed decisions within a more expansive context than international learners. This is mainly due to the fact that the South African Qualification is very explicit in the way Fundamental, Core and Elective competencies play a role in contextual competence.

It is not evident what the credit value for this qualification is as Australia seems to use a points system. Also, the Mandatory unit do not have a points value allocation.

ARTICULATION OPTIONS

The Qualification has been designed and structured so that qualifying learners may move from one engineering context to certain other engineering contexts (within same indu.try sector or to new industry sectors). This can be achieved by the selection of appropriate credits in the elective category. Equally, holders of other similar qualifications may be evaluated against this qualification for the purpose of RPL.

Vertical articulation:

- ID 58720: National Certificate: Engineering Fabrication, NQF Level 3.

Horizontal articulation:

- ID 57881: National Certificate: Welding Application and Practice, Level 2.
- ID 23273: National Certificate: Mechanical Engineering Fitting, NQF Level 2.

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

Core learning at this level may lead to credit accrual for some unit standards in the following qualifications, NQF Level 2:

- National Certificates in Mechanical Engineering (Welding), (Fitting), (Machining).
- Vehicle Servicing.

• Automotive Component Manufacturing.

MODERATION OPTIONS

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

• Any institution offering learning that will enable the achievement of this qualification must be accredited as a provider with the relevant Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding with the relevant ETQA.

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

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

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

CRITERIA FOR THE REGISTRATION OF ASSESSORS

Assessors should be in possession of:

• An appropriate qualification at or above the level of the qualification and preferably relevant workplace practical experience.

• Registration as an assessor with the relevant ETQA.

NOTES

This qualification replaces qualification 22869, "National Certificate: Engineering Fabrication", NQF Level 2, 159 credits.

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Core	243067	Cut materials using the oxy-fuel gas cutting process (manual cutting)	Level 2	6
Core	243075	Draw and interpret simple plate, pipe and structural steel plate, pipe and structural steel drawings	Level 2	6
Core	12240	Form and shape sheetmetal using hand or power operated machines	Level 2	8
Core	244345	Identify fabrication materials, their characteristics and applications used in engineering	Level 2	4
Core	244342	Measure and mark off steel profiles	Level 2	2
Core	12239	Mechanically cut, drill and punch fabrication materials.	Level 2	10
Core	13214	Operate and monitor a drilling machine to produce simple components	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
Core	12481	Sling loads	Level 2	4
Core	243063	Weld carbon steel work-pieces using the shielded metal arc welding process in the down-hand position.	Level 2	15
Core	243072	Weld workpieces using the oxy-acetylene gas welding process in the downhand position	Level 2	10

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Core	9443	Work safely and use safety equipment	Level 2	7
Core	12246	Assemble and mechanically join sheet, plate, tube, pipe and steel sections	Level 3	4
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	117902	Use generic functions in a Graphical User Interface (GUI)-environment	Level 1	4
Elective	115101	Address workplace hazards and risks	Level 2	4
Elective	116520	Apply safety, health and environmental principles and procedures in a workplace	Level 2	2
Elective	14683	Apply work site practices	Level 2	5
Elective	10824	Bend a pipe by means of a hydraulic pipe bender	Level 2	2
Elective	116533	Demonstrate basic knowledge and understanding of emergency preparedness and response	Level 2	2
Elective	110205	Demonstrate knowledge of the Mine Health and Safety Act, regulations and definitions	Level 2	5
Elective	12465	Develop a learning plan and a portfolio for assessment	Level 2	6
Elective	12466	Explain the individual's role within business	Level 2	4
Elective	244340	Fasten components by means of swage lock bolts (Huck bolt)	Level 2	1
Elective	9678	Follow basic health and safety practices underground	Level 2	5
Elective	12482	Join metals using the resistance welding process	Level 2	4
Elective	9268	Manage basic personal finance	Level 2	6
Elective	116235	Operate a pendant controlled overhead crane	Level 2	5
Elective	12484	Perform basic fire fighting	Level 2	4
Elective	12483	Perform basic first aid	Level 2	4
Elective	115547	Replace conveyor belt steel structures (stringers, cradles)	Level 2	3
Elective	12463	Understand and deal with HIV/AIDS	Level 2	3
Elective	14713	Use welding definitions and symbols	Level 2	5
Elective	115093	Control workplace hazardous substances	Level 3	4
Elective	244339	Mark off and fabricate sections using the contour marker method	Level 3	9
Elective	243053	Weld carbon steel workpieces using the oxy-acetylene gas welding process in all positions	Level 3	10
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	12461	Communicate at work	Level 2	5
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	7469	Use mathematics to investigate and monitor the financial aspects of personal and community life	Level 2	2
Fundamental	9007	Work with a range of patterns and functions and solve problems	Level 2	5
Fundamental	119456	Write/present for a defined context	Level 2	5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Mark off and fabricate sections using the contour marker method

SAQA US ID	*UNIT STANDARD TITLE*		
244339	Mark off and fabricate sections using the contour marker method		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering & Technolog			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	9

SPECIFIC OUTCOME 1
Explain the factors critical to fabricating sections.

SPECIFIC OUTCOME 2
Prepare to mark off and fabricate a section.

SPECIFIC OUTCOME 3
Mark off and fabricate the section.

SPECIFIC OUTCOME 4
Complete the marking off and fabricating process.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Fasten components by means of swage lock bolts (Huck bolt)

SAQA US ID	*UNIT STANDARD TITLE*		
244340	Fasten components by means of swage lock bolts (Huck bolt)		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering & Technolog			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	1

SPECIFIC OUTCOME 1
Explain the factors critical to fastening components by means of swage lock bolts (Huck bolt).

SPECIFIC OUTCOME 2
Prepare to fasten components by means of huckbolts.

SPECIFIC OUTCOME 3
Fasten components by means of swage lock bolts (Huck bolt).

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

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Measure and mark off steel profiles

SAQA US ID	*UNIT STANDARD TITLE*		
244342	Measure and mark off steel profiles		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering & Technolog			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	2

SPECIFIC OUTCOME 1
Explain the factors critical to measuring and marking off steel profiles.

SPECIFIC OUTCOME 2
Prepare to measure and mark off the steel profiles.

SPECIFIC OUTCOME 3
Measure and mark off the steel profiles.

SPECIFIC OUTCOME 4
Complete the measuring and marking off process.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Identify fabrication materials, their characteristics and applications used in engineering

SAQA US ID	*UNIT STANDARD TITLE*		
244345	Identify fabrication materials, their characteristics and applications used in engineering		
ORIGINATOR		*PROVIDER*	
SGB Generic Manufacturing, Engineering & Technolog			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 2	4

SPECIFIC OUTCOME 1
Identify common engineering fabrication materials.

SPECIFIC OUTCOME 2
Determine the physical properties and perform and perform material testing on engineering fabrication materials.

SPECIFIC OUTCOME 3
Determine information and characteristics of steel sections and profiles.