No. 1160 **24 November *2006***

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

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

Welding

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, subfields, NQF levels, credits, and purpose of the qualifications and unit standard. The qualifications and unit standard 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* 23 December 2006.** All correspondence should be marked **Standards Setting – SGB for Welding** and addressed to

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SAQA
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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:

National Certificate: Welding Application and Practice

SAQA QUAL ID	*QUALIFICATION TITLE*		
57881	National Certificate: Welding Application and Practice		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		6	
QUAL TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD*
National Certificate		Manufacturing, Engineering and Technology	Manufacturing and Assembly
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUALIFICATION CLASS*
Undefined	158	Level 2	Regular-Unit Stds Based

PURPOSE AND RATIONALE OF THE QUALIFICATION

Purpose:

The purpose *of* this Qualification is to provide learners with the standards and the range of learning required to work effectively in the welding industry and to meet the challenges *of* such an environment.

This Qualification recognises the basic skills, knowledge and values acquired by learners involved in welding. The purpose of this Qualification is to develop learners who, after completion, demonstrate the ability to:

> Use and apply mechanical and welding technology, techniques, processes and skills, as applied in the fabrication and welding industry, using appropriate tools and measuring equipment.
> Use and apply a variety of fillet welding, oxy-fuel cutting and oxy-fuel joining processes.
> Demonstrate knowledge of the welding industry and its productivity requirements, by applying appropriate work-procedures.
> Communicate effectively in order to achieve personal, business and organizational objectives. (Range: Reading and interpreting work instructions, documents and drawings; maintaining effective relationships; exploring options for further learning).

This Qualification requires that learners qualify in basic welding practice and theoretical knowledge in weld preparation, cutting and brazing.

Qualifying learners will also understand:

> Welding Safety and applicable work-site practice.
> Effective communication techniques within the workplace.
> Numeracy skills applicable to the welding environment.
> Dealing with HIV-aids.

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

What learners achieve in this Qualification will also serve as a basis for further learning where they will further develop their skills and knowledge to include more complex welding processes, equipment **and** techniques.

Rationale:

This is the first Qualification in a learning pathway for learners who want to follow a career in welding. The qualification replaces the National Certificate: Welding Application and Practice **NQF** Level 2 and the interimly registered qualification - National Certificate: Chemical Welder **NQF** Level **2.**

This Qualification focuses on developing skills and knowledge necessary to begin such a career.

The welding industry operates in a competitive and challenging environment. The finished processes have to respond to a wide variety of exacting customer and consumer requirements. In addition, the industry has to respond to international competition and environmental issues.

Welding application and practice require joining and cutting of materials that meet national and international requirements. Welding generally requires the joining of material that is subjected to considerable stress when in operation and the welding process needs to be consistent and accurate.

This Qualification forms part of a series at different levels to create opportunities for development, a career path and greater security of employment within the welding industry.

This Qualification enables learners who have gained relevant experience in the workplace to obtain credits through the RPL process.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

It is assumed that learners are already competent in:
> Communication and Mathematical Literacy at NQF Level 1.

Recognition of prior learning:

This qualification can be obtained in part or wholly through the recognition of prior learning. The learner should be thoroughly briefed on the mechanism to be used and support and guidance should be provided. Care should be taken that the mechanism used provides the learner with an opportunity to demonstrate competence and is not so onerous as to prevent learners from taking up the RPL option towards gaining a Qualification.

QUALIFICATION RULES

> **All** the fundamental unit standards totalling 36 credits are compulsory.
> **All** the core unit standards totalling 106 credits are compulsory.
> **A** minimum of 16 credits should be chosen from the electives. A minimum of 166 credits is required to obtain the qualification.

EXIT LEVEL OUTCOMES

1. Use and apply mechanical and welding technology, techniques, processes and skills, as applied in the fabrication and welding industry, using appropriate tools and measuring equipment.
2. Use and apply a variety of fillet welding, oxy-fuel cutting and oxy-fuel joining processes.
3. Demonstrate knowledge of the welding industry and its productivity requirements, by applying appropriate work-procedures.
4. Communicate effectively in order to achieve personal, business and organizational objectives.
> Range: Reading and interpreting work instructions, documents and drawings; maintaining effective relationships; exploring options for further learning.

ASSOCIATED ASSESSMENT CRITERIA

1

> Mechanical and welding technology concepts, techniques and processes are explained and applied within a fabrication and welding context.
> Tools, measuring equipment and engineering materials are used and applied in accordance with performance standards.
> Occupational health, safety and environmental legislation, including safety practices and procedures, are applied to the fabrication and welding industry in accordance with standard operating procedures.
> Welding machinery, tools and equipment, are cleaned and stored according to standard operating procedures.

2

> Fillet welding technique is applied in the downhand position and tested in accordance with performance standards.

> Welding processes are applied in accordance with performance standards.
> Range: Welding processes include Shielded metal arc welding; gas metal arc welding; gas tungsten arc welding; cored-wire welding; gas-welding.
> Oxy-fuel joining and cutting processes are applied in accordance with performance standards.
> Range: Oxy-fuel joining and cutting processes include gas-brazing and gas-cutting of plate and structures.
> Specific safety practices and procedures are applied relevant to the fabrication and welding industry.
> Welding machinery, tools and equipment, are cleaned and stored according to standard operating procedures.
> Work-pieces are assessed in accordance with performance qualification standards.

3

> Communication processes and terminology are explained and demonstrated within the context of the welding industry.
> Productivity requirements are explained within the context of the welding industry.
> Problems are identified in a timely manner, reported and discussed and the agreed corrective action is implemented.
> Information is interpreted to implement work instructions.
> Specific safety practices and procedures are applied relevant to the fabrication and welding industry.

4

> Communication skills are demonstrated in various work-related situations.
> Relationships with peers are maintained to promote effective communication within the workplace.
> Concise reports are produced for record keeping purposes.
> Learning opportunities are identified and discussed in order to produce a learning plan.

Integrated assessment:

Integrated assessment at the level of this Qualification provides an opportunity for learners to show they are able to integrate concept, actions and values 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.

Some assessment aspects will demand practical demonstration while others may not. In some cases inference will be necessary to determine competence depending on the nature and context within which performance takes place.

Assessors will collect evidence of the learner's competence by:

> Observing the learner at work (both in primary activities as well as other interactions) or by relevant simulations.
> Asking questions and initiating short discussions to test understanding.
> Looking at records and reports.

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 on the approach being taken.

Since this is a foundational Qualification, 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 the critical cross-field outcomes have been achieved.

INTERNATIONAL COMPARABILITY

International comparability in welding programmes has two divergent categories:

> Comparitive education and training content, at a specific levels within the context of the NQF.
> Comparitive quality assurance standards for international qualification, certification and licensing.

Comparitive education and training content:

It must be stated from the outset of this statement that reference to international benchmarking for this qualification series, applies only to the education and training content at specific levels between NQF 2, 3

and 4 and its measure of "appropriateness" when compared with welder training programmes internationally.

International Benchmarking was done against the contents of the International Welder Qualification as specified and prepared by the International Authorisation Board (IAB Group A, WG A3A; IAB-089-2003/EWF-452-467-480-481 Rev.3 - January 2005; expires 31st December 2007). This bechmarking was done in order to align the education and training content of this Qualification Series: National Certificate in Welding Application and Practice NQF 2 and 3 and Further Education and Training Certificate NQF 4, according to international standards.

The comparison with the training approach advocated by the International Welding Institute (IIW) through its "Bratislava Agreement" is particularly valuable, since they also lead to a European Community (EC) standard for Welding, making the International Welder Diploma equivalent to the European Welder Diploma. Participants in the "Bratislava Agreement" include the South African Institute of Welding (SAIW).

This exercise also included an investigation into the American (USA) Welding Society's (AWS) approach to introductory, intermediate and advanced education and training programmes related to welding.

African countries with manufacturing and engineering infrastructure (including SADC countries) were scanned for applicable qualifications or training programmes, but no relevant qualifications are offered in any of these countries.

Good international comparability, including similar core qualification structures and progressions from NQF Level 2 to NQF Level 3, were found in the Australian, New Zealand, British and Scottish qualifications.

A direct comparison with these international qualifications indicates that the education and training focus of all the qualifications is basically the same. The reference to level descriptors differ, in order to accommodate the NQF and outcomes-based education approach. This qualification series therefore makes an attempt at equating the education and training content of the three international skills levels by creating three distinct South African (NQF) welding qualifications, viz:

> International fillet welder - National Certificate in Welding Application and Practice NQF 2.
> International plate welder - National Certificate in Welding Application and Practice NQF 3.
> International pipe welder - Further Education and Training Certificate in Welding Application and Practice NQF 4.

Comparitive quality assurance standards:

This qualification series differs from the international qualification benchmark, in that it does not require the welded work of learners to be quality assured according to the criteria specified by ISO 9606 (or equivalent) qualification tests. Learners may be found competent in accordance with the assessment criteria of the applicable SAQA-registered unit standard after being quality-assured by the presiding ETQA.

Due to the wide reference list of international standards (Welding Code Specifications), an open range statement has been developed for those learning outcomes which refer to "Inspect the welded workpiece". Range statement: "Welded joints acceptance criteria to be in accordance with national and/or international welding standards", refers to:

American Welding Society (AWS):

> AWS D1.1 Structural Welding Code Steel.
> AWS D1.2 Structural Welding Code Aluminum,
> AWS D1.3 Structural Welding Code Sheet Steel.
> AWS D1.4 Structural Welding Code Reinforcing Steel.
> AWS D1.5 Bridge Welding Code.
> AWS D10.9 Welding Code for Pipe and Tubing.

American Society of Mechanical Engineers (ASME)/ASME Section IX Boiler & Pressure Vessel Code.

American Petroleum Institute (API)/Standard 1104 for Welding Pipe Lines and Related Facilities.

British Standard (BS):

> BS 4870 Approval Testing of Welding Procedures.
> BS 4871 Approval Testing Of Welders Working To Approved Welding Procedures.
> BS 4872 Approval Testing Of Welders When Welding Procedure Approval Is Not Required.

International Standard Organization (ISO):
> ISO 9606 -1 Approval Testing of Welders - Fusion Welding Part 1: Steel.

This Welding Qualification compares well with the best international qualifications and training programmes offered. The additional operational content incorporated in the qualification will serve to support qualifying learners to make better informed, autonomous decisions within a more expansive timeframe than international learners.

ARTICULATION OPTIONS

This qualification allows for both horizontal and vertical articulation:

Vertical articulation can occur with:
> 24213: National Certificate: Welding Application and Practice: NQF Level 3.

Horizontal articulation can occur with:

> 23273: National Certificates in Mechanical Engineering (Fitting): NQF **2.**
> 23277: National Certificates in Mechanical Engineering (Machining): NQF 2.
> 22869: National Certificates in Engineering (Fabrication): NQF 2.
> 49689: National Certificates in Automotive Repairs and Maintenance: NQF 2.

MODERATION OPTIONS

> Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with an appropriate 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 ETQA or with an ETQA that has a Memorandum of Understanding with the relevant ETQA.
> Moderation of assessment will be overseen by the relevant ETQA or by an ETQA that has a Memorandum of Understanding with the relevant ETQA, according to the ETQAs policies and guidelines for assessment and moderation.
> Moderation must include both internal and external moderation of assessments at exit points of the Qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual Unit Standards as well as in the exit level outcomes described in the Qualification.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

The following criteria should be applied by the relevant ETQA:

> Appropriate Qualification in the field of welding application and practice at NQF level 3 and a minimum of 2 years' experience in the welding industry.
> Appropriate experience and understanding of assessment theory, processes and practices.
> Registration as an assessor with the relevant ETQA.

NOTES

This qualification replaces qualification 24214, " National certificate: Welding application and practice", Level 2, 161 credits.

This submission is the product of the combined review process of the following qualifications:

> SAQA ID: 24214 - National Certificate: Welding Application and Practise, Level 2.
> SAQA 0151/03 on 03 December 2003.

And

> National Certificate: Chemical Welder (Interim-registered.) SAQA ID: 13634.

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

	UNIT STANDARD ID AND TITLE	LEVEL	CREDITS	STATUS
/core	12219 Select, use and care for engineering power tools	Level 2	6	Reregistered

Core	12476 Select, use and care for engineering measuring equipment	Level 2	4	Registered
Core	14683 Apply work site practices	Level 2	5	Registered
Core	14712 Identify and select material to specification	Level 2	5	Registered
Core	14713 Use welding definitions and symbols	Level 2	5	Registered
Core	14722 Describe the welding industry's composition its productivity requirements and communication techniques	Level 2	5	Registered
Core	119744 Select, use and care for engineering hand tools	Level 2	8	Registered
Core	243069 Braze metals using the oxy-fuel brazing process	Level 2	6	Draft - Prep for P Comment
Core	243072 Weld workpieces using the oxy-acetylene gas welding process in the downhand	Level 2	10	Draft - Prep for P
Elective				
Elective	14701 Join sheetmetal with resistance arc welding process	Level 2	4	Registered
	all positions			Comment
	and community life			
Fundamental	7480 Demonstrate understanding of rational and irrational numbers and number systems	Level 2	3	Reregistered
Fundamental	9007 Work with a range of patterns and functions and solve problems	Level 2	5	Reregistered
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	Reregistered
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	Reregistered
Fundamental	119454 Maintain and adapt oral/signed communication	Level 2	5	Registered
Fundamental	119456 Write/present for a defined context	Level 2	5	Registered
Fundamental	119460 Use language and communication in occupational learning programmes	Level 2	5	Registered
Fundamental	119463 Access and use information from texts	Level 2	5	Registered

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 1

Prepare and secure work pieces for welding (includes the use of manipulators)

SAQA US ID	*UNIT STANDARD TITLE*
243055	Prepare and secure work pieces for welding (includes the use of manipulators)

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding	6	

UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Manufacturing and Assembly
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	*8*	Level 2	Regular

SPECIFIC OUTCOME 1

Plan the preparation process for the job.

SPECIFIC OUTCOME 2

Identify and select tools and equipment.

SPECIFIC OUTCOME 3

Prepare work pieces for welding.

SPECIFIC OUTCOME 4

Assess end product.

SPECIFIC OUTCOME 5

Complete documentation.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 2

SAQA US ID	*UNIT STANDARD TITLE*
243056	Weld carbon steel workpieces using the shielded metal arc welding process in all positions

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding	***6***	

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

ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	16	Level 2	Regular

SPECIFIC OUTCOME 1

Describe and assemble the shielded metal arc welding equipment.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre operational checks of shielded metal arc welding equipment.

SPECIFIC OUTCOME 3

Prepare workpieces prior to welding.

SPECIFIC OUTCOME **4**

Weld workpieces.

SPECIFIC OUTCOME ***5***

Inspect welded work piece.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **3**

Assemble work pieces in jigs (minor amendments include the use of manipulators)

SAQA US ID	*UNIT STANDARD TITLE*		
243061	Assemble work pieces in jigs (minor amendments include the use of manipulators)		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		6	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Manufacturing and Assembly
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	3	Level 2	Regular

SPECIFIC OUTCOME 1

Follow the assembling procedure of jigging work pieces prior to welding.

SPECIFIC OUTCOME 2

Identify and select components and jigs.

SPECIFIC OUTCOME 3

Assemble components.

SPECIFIC OUTCOME 4

Inspect assembled work piece.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **4**

SAQA US ID	*UNIT STANDARD TITLE*		
243063	Weld carbon steel work-pieces using the shielded metal arc welding process in the down-hand position.		
S 3E NAME		*ORGANISING FIELD ID*	*PRC M E N*
SGB Welding		11	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	15	Level 2	Regular

SPECIFIC OUTCOME 1

Describe the shielded metal arc welding process.

SPECIFIC OUTCOME 2

Select, set up and conduct pre-operational checks of shielded metal arc welding equipment.

SPECIFIC OUTCOME 3

Prepare workpieces prior to welding.

SPECIFIC OUTCOME 4

Weld workpieces.

SPECIFIC OUTCOME 5

inspect welded workpiece for defects in compliance with drawing specifications.

SPECIFIC OUTCOME 6

Care *for* and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 5

Weld carbon steel workpieces, using the gas metal arc welding process in all positions

SAQA US ID	*UNIT STANDARD TITLE*		
243064	Weld carbon steel workpieces, using the gas metal arc welding process in all positions		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		6	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	15	Level 2	Regular

SPECIFIC OUTCOME 1

Describing the gas metal arc welding process and related equipment.

SPECIFIC OUTCOME 2

Select, set up and conduct pre-operational checks of gas metal arc welding equipment.

SPECIFIC OUTCOME 3

Prepare workpieces prior to welding.

SPECIFIC OUTCOME 4

Weld workpieces.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: ***6***

Weld carbon steel workpieces using the gas metal arc welding process in the down-hand position

SAQA US ID	*UNIT STANDARD TITLE*
243066	Weld carbon steel workpieces using the gas metal arc welding process in the down-hand position

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding	6	

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

ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	*8*	Level 2	Regular

SPECIFIC OUTCOME **1**

Describe the gas metal arc welding process and related equipment.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre-operational checks of gas metal arc welding equipment.

SPECIFIC OUTCOME 3

Prepare workpieces prior to welding.

SPECIFIC OUTCOME 4

Weld workpieces.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 7

SAQA US ID	***UNIT STANDARD TITLE***		
243067	Cut materials using the oxy-fuel gas cutting process (manual cutting)		
SGB NAME		***ORGANISING FIELD ID***	***PROVIDER NAME***
SGB Welding		6	
UNIT STANDARD TYPE		***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	6	Level 2	Regular

SPECIFIC OUTCOME 1

Describe the oxy-fuel cutting process.

SPECIFIC OUTCOME 2

Prepare for the oxy-fuel cutting operation.

SPECIFIC OUTCOME 3

Cut material.

SPECIFIC OUTCOME 4

Care and storage of cutting equipment, tools, and materials.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 8

Braze metals using the oxy-fuel brazing process

SAQA US ID	*UNIT STANDARD TITLE*
243069	Braze metals using the oxy-fuel brazing process

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding	*6*	
UNIT STANDARD TYPE	*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design

ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	6	Level 2	Regular

SPECIFIC OUTCOME 1

Describe the oxy-fuel brazing process.

SPECIFIC OUTCOME 2

Prepare workpiece prior to brazing.

SPECIFIC OUTCOME 3

Prepare workpieces prior to brazing.

SPECIFIC OUTCOME 4

Braze workpiece.

SPECIFIC OUTCOME 5

Inspect brazed workpiece.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **9**

Weld workpieces using the oxy-acetylene gas welding process in the downhand position

SAQA US ID	***UNIT STANDARD TITLE***		
243072	Weld workpieces using the oxy-acetylene gas welding process in the downhand position		
SGB NAME		***ORGANISING FIELD ID***	***PROVIDER NAME***
SGB Welding		***6***	
UNIT STANDARD TYPE		***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	10	Level 2	Regular

SPECIFIC OUTCOME **1**

Describe and explain the oxy-acetylene gas welding process.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre operational checks of oxy-acetylene gas welding equipment.

SPECIFIC OUTCOME 3

Prepare workpieces prior to welding.

SPECIFIC OUTCOME 4

Weld metals with oxy-acetylene gas welding process.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

SAQA US ID	UNIT STANDARD TITLE
243074	Weld carbon steel components, using the submerged arc welding process in a downhand position

SGB Welding		6	
UNIT STANDARD TYPE		ORGANISING FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	12	Level 2	Regular

SPECIFIC OUTCOME 1

Describe and explain the submerged arc welding process and related equipment.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre-operational checks of submerged arc welding equipment.

SPECIFIC OUTCOME 3

Prepare component/s prior to welding.

SPECIFIC OUTCOME 4

Weld workpiece.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 11

Draw and interpret simple plate, pipe and structural steel plate, pipe and structural steel drawings

SAQA US ID	*UNIT STANDARD TITLE*
243075	Draw and interpret simple plate, pipe and structural steel plate, pipe and structural steel drawings

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding	6	
UNIT STANDARD TYPE	***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular	Manufacturing, Engineering and Technology	Manufacturing and Assembly

ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	6	Level 2	Regular

SPECIFIC OUTCOME 1

Demonstrate methods of construction to produce basic plate, pipe and structural steel plate, pipe and structural steel drawings and sketches.

SPECIFIC OUTCOME 2

Draw and interpret basic plate, pipe and structural steel engineering projections.

SPECIFIC OUTCOME 3

Interpret and draw a development using the parallel-line method.

SPECIFIC OUTCOME 4

Interpret and draw a development using the radial-line method

SPECIFIC OUTCOME 5

Interpret and draw a development using triangulation.

SPECIFIC OUTCOME 6

Interpret and draw isometric pipe drawings.

SOUTH AFRICAN QUALIFICATIONS AUTHORIN

UNIT STANDARD: **12**

SAQA US ID	***UNIT STANDARD TITLE***		
243076	Weld carbon steel workpieces using the cored-wire welding process in the downhand position		
SGB NAME		***ORGANISING FIELD ID***	***PROVIDER NAME***
SGB Welding		***6***	
UNIT STANDARD TYPE		***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	***8***	Level ***2***	Regular

SPECIFIC OUTCOME 1

Describe the cored-wire welding process.

SPECIFIC OUTCOME 2

Select, set up and conduct pre-operationalchecks of cored-wire welding equipment.

SPECIFIC OUTCOME 3

Prepare workpieces prior to welding.

SPECIFIC OUTCOME 4

Weld workpieces.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:

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SAQA QUAL ID	*QUALIFICATION TITLE*		
57886	National Certificate: Welding Application and Practice		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		*6*	
QUAL TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD*
National Certificate		Manufacturing, Engineering and Technology	Manufacturing and Assembly
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUALIFICATION CLASS*
Undefined	151	Level 3	Regular-Unit Stds Based

PURPOSE AND RATIONALE OF THE QUALIFICATION

Purpose:

The purpose of this Qualification is to provide learners with the standards and the range of learning required to work effectively in the welding industry and to meet the challenges of such an environment.

This Qualification recognises the intermediate level skills, knowledge and values acquired by learners involved in welding. The purpose of this Qualification is to develop learners **who,** after completion, demonstrate the ability to:

> Use and apply a variety of plate welding, cutting, and gouging processes according to performance standards.
> Demonstrate an understanding of welding procedures and the quality of welded components.
> Maintain organizational relationships through effective communication with clients, peers and members of supervisory/management levels.
> Range: Maintaining effective relationships; verbal and written reporting; exploring options for further learning.

Welding skills and techniques play a role in this Qualification.

This Qualification requires that learners apply intermediate level welding practice and theoretical knowledge, within any of tha following environments:

> Manufacturing and Assembly.
> Chemical Plant Installations.
> Food Processing Plant Installations.
> Mining.
> Building and Construction.
> This qualification may be applied in other relevant engineering environments.

Qualifying learners will also understand:

> The basics of business finance.
> The investigation and monitoring *of* the financial aspects of personal, business and national issues.
> Effective communication techniques (oral and written) when dealing with clients and fellow workers, while participating in workplace activities.
> Applicable numeracy skills at this level.
> Managing work-time effectively (Productivity).

What learners achieve in this Qualification will also serve as a basis for further learning where they will

further develop their skills and knowledge to include more complex welding processes and techniques.

Rationale:

This is the second Qualification in a learning pathway for learners who want to follow a career in welding. The qualification replaces the National Certificate: Welding Application and Practice NQF Level 3, and the interimly registered qualification: National Certificate: Chemical Welder (NQF Level 3).

This Qualification focuses on developing skills and knowledge necessary to establish a career in welding at an intermediate level.

The welding industry operates in a competitive and challenging environment. The finished processes have to respond to a wide variety of exacting customer and consumer requirements. In addition, the industry has to respond *to* international competition and environmental issues.

Welding application and practice require joining and cutting of materials that meet national and international requirements. Welding generally requires the joining of material that is subjected to considerable stress when in operation and the welding process therefore needs to be consistent and accurate.

This Qualification forms part of a series at different levels to create opportunities for development, a career path and greater security of employment within the welding industry.

This Qualification enables learners who have gained relevant experience in the workplace to obtain credits through the RPL process.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

It is assumed that learners are already competent in Communication and Mathematical Literacy at NQF Level 2.

Recognition of Prioir Learning:

This qualification may be obtained in part or wholly through the recognition of prior learning. The learner should be thoroughly briefed on the mechanism to be used and support and guidance should be provided. Care should be taken that the mechanism used provides the learner with an opportunity to demonstrate competence and is not so onerous as to prevent learners from taking up the RPL option towards gaining a Qualification.

Access to the Qualification:

Access to this qualification is open. However, it is preferable that learners have completed the National Certificate: Welding Application and Practice: NQF Level 2.

QUALIFICATION RULES

The rules *of* combination for this Qualification:

> **All** the fundamental unit standards totalling **40** credits are compulsory.
> **All** the core unit standards totalling *95* credits are compulsory.
> **A** minimum of **16** credits should be chosen from the electives.

A minimum of 151 is required to obtain the qualification.

EXIT LEVEL OUTCOMES

1. Use and apply a variety of plate welding, cutting, and gouging processes according to performance standards.
2. Demonstrate an understanding of welding procedures and the quality of welded components.
3. Maintain organizational relationships through effective communication with clients, peers and members *of* supervisory/management levels.

Range: Maintaining effective relationships; verbal and written reporting; exploring options for further learning.

ASSOCIATED ASSESSMENT CRITERIA

1.
> Plate welding technique is applied and tested in all positions according to performance standards.
> Welding processes are applied in accordance with performance standards.
> Range: Welding processes include shielded metal arc welding; gas metal arc welding; gas tungsten arc welding; cored-wire welding and oxy-fuel welding.
> Cutting and gouging processes are applied in accordance with performance standards.
> Range: Cutting and gouging processes include oxy-fuel cutting, air-carbon arc and/or shielded metal arc gouging processes.
> Workpieces are secured prior to welding, post-weld defects are eliminated in accordance with performance standards.
> Range: Defects refer to warping; misalignment; non-rectilinear work; cracks and distortion.
> Safety practices and procedures relevant to the fabrication and welding industry are applied in accordance with applicable legislation

2.
> Quality assurance practices applicable to the fabrication and welding industry are monitored and controlled by ensuring compliance to specification procedures.
> Productivity is maintained and production results are reflected with the use of tables and graphs.

3.
> Relationships with peers, supervisory and management levels are established and functioning to promote communication within the workplace.
> Correct information is communicated through written reports.
> Problems are identified in a timely manner, reported and discussed and the agreed corrective action is implemented.
> Learning opportunities and preparation requirements are identified and a learning plan is developed.

Integrated Assessment:

integrated assessment during, this qualification provides an opportunity for learners to show they are able to integrate lifeskills and values achieved across a range of unit standards and contexts, with the added practical orientation gained at this level. Integrated assessment must evaluate the quality of observable performance as well as the thinking behind the performance.

Some assessment aspects will demand practical demonstration while others may not. In some cases inference will be necessary to determine competence depending on the nature and context within which performance takes place.

Assessors will collect evidence of the learner's competence by:

> Observing the learner at work (both in primary activities as well as other interactions) or by relevant simulations.
> Asking questions and initiating short discussions to test understanding.
> Looking at records and reports.

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 on the approach being taken.

Since this is an intermediate level qualification, it is necessary to ensure that the lifeskills part of the qualification is also targeted to ensure that while the competence may have been achieved in the skills context, learners are able to apply it in a range of other contexts and for further learning, emphasizing leadership and responsibility. The assessment should also ensure that the critical cross-field outcomes have been achieved.

INTERNATIONAL COMPARABILITY

International comparability in welding programmes has two divergent categories:

> Comparitive education and training content, at a specific levels within the context of the South African National Qualifications Framework (NQF).
> Comparitive quality assurance standards for international qualification, certification and licensing.

Comparitive education and training content:

It must be stated from the outset of this statement that reference to international benchmarking for this qualification series, applies only to the education and training content at specific levels between NQF 2, 3 and 4 and its measure of "appropriateness" when compared with welder training programmes internationally.

International Benchmarking was done against the contents of the International Welder Qualification as specified and prepared by the International Authorisation Board (IAB Group A, WG A3A; IAB-089-2003/EWF-452-467-480-481 Rev.3 - January 2005; expires 31st December 2007). This bechmarking was done in order to align the education and training content of this Qualification Series: National Certificate in Welding Application and Practice NQF 2 and 3 and Further Education and Training Certificate NQF 4, according to international standards.

The comparison with the training approach advocated by the International Welding Institute (IIW) through its "Bratislava Agreement" is particularly valuable, since they also lead to a European Community (EC) standard for Welding, making the International Welder Diploma equivalent to the European Welder Diploma. Participants in the "Bratislava Agreement" include the South African Institute, of Welding (SAIW).

This exercise also included an investigation into the American (USA) Welding Society's (AWS) approach to introductory, intermediate and advanced education and training programmes related to welding. African countries with manufacturing and engineering infrastructure (including SADC countries) were scanned for applicable qualifications or training programmes, but no relevant qualifications are offered in any of these countries.

Good international comparability, including similar core qualification structures and progressions from NQF Level 2 to NQF Level 3, were found in the Australian, New Zealand, British and Scottish qualifications.

A direct comparison with these international qualifications indicates that the education and training focus of all the qualifications is basically the same. The reference to level descriptors differ, in order to accommodate the NQF and outcomes-based education approach. This qualification series therefore makes an attempt at equating the education and training content of the three international skills levels by creating three distinct South African (NQF) welding qualifications, viz:

> International fillet welder - National Certificate in Welding Application and Practice NQF 2.
> International plate welder - National Certificate in Welding Application and Practice NQF 3.
> International pipe welder - Further Education and Training Certificate in Welding Application and Practice NQF 4.

Comparitive quality assurance standards:

This qualification series differs from the international qualification benchmark, in that it does not require the welded work of learners to be quality assured according to the criteria specified by ISO 9606 (or equivalent) qualification tests. Learners may be found competent in accordance with the assessment criteria of the applicable SAQA-registered unit standard after being quality-assured by the presiding ETQA.

Due to the wide reference list of international standards (Welding Code Specifications), an open range statement has been developed for those learning outcomes which refer to "Inspect the welded workpiece". Range statement: "Welded joints acceptance criteria to be in accordance with national and/or international welding standards", refers to:

American Welding Society (AWS):

> AWS D1.l Structural Welding Code Steel.
> AWS D1.2 Structural Welding Code Aluminum.
> AWS D1.3 Structural Welding Code Sheet Steel.
> AWS D1.4 Structural Welding Code Reinforcing Steel.
> AWS D1.5 Bridge Welding Code.
> AWS D10.9 Welding Code for Pipe and Tubing.

American Society of Mechanical Engineers (ASME)/ASME Section IX Boiler & Pressure Vessel Code.

American Petroleum Institute (API)/Standard 1104 for Welding Pipe Lines and Related Facilities.

British Standard (BS):

> BS 4870 Approval Testing of Welding Procedures.
> BS 4871 Approval Testing Of Welders Working To Approved Welding Procedures.

> BS 4872 Approval Testing Of Welders When Welding Procedure Approval Is Not Required

International Standard Organization (ISO):
> ISO 9606 -1 Approval Testing of Welders - Fusion Welding Part 1: Steel.

This Welding Qualification compares well with the best international qualifications and training programmes offered. The additional operational content incorporated in the qualification will serve to support qualifying learners to make better informed, autonomous decisions within a more expansive timeframe than international learners.

ARTICULATION OPTIONS

This qualification allows for both horizontal and vertical articulation.

> Vertical articulation can occur with:
> ID 57887: FETC: Welding Application and Practice, NQF 4.

> Horizontal articulation can occur with:

> ID 22870: National Certificates in Engineering: Fabrication, NQF 3.
> ID 23274: National Certificates in Mechanical Engineering: Fitting, NQF 3.
> ID 23278: National Certificates in Mechanical Engineering: Machining, NQF 3.
> ID 23280: National Certificates in Mechanical Engineering: Tooling Manufacture, NQF 3.

MODERATION OPTIONS

> Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with an appropriate 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 ETQA or with an ETQA that has a Memorandum of Understanding with the relevant ETQA.

> Moderation of assessment will be overseen by the relevant ETQA or by an ETQA that has a Memorandum of Understanding with the relevant ETQA, according to the ETQAs policies and guidelines for assessment and moderation.

> Moderation must include both internal and external moderation of assessments at exit points of the Qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual Unit Standards as well as in the exit level outcomes described in the Qualification.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

The following criteria should be applied by the relevant ETQA:

> Appropriate Qualification in the field of welding application and practice at NQF level 4 and a minimum of 2 years' experience in the welding industry. The subject matter experience of the assessor can be established by recognition of prior learning,
> Registration as an assessor with the relevant ETQA.

NOTES

This qualification replaces qualification 24213, "National Certificate: Welding Application and Practice", Level 3, 174 credits.

This submission is the product of the combined review process of the following qualifications:

> SAQA ID: 24213 - National Certificate: Welding Application and Practise, Level 3.
> SAQA 0151/03 registered on 03 December 2003.
> SAQA ID: 13633 - National Certificate: Chemical Welder (Interim-regd.).

core	243056 Weld carbon steel workpieces using the shielded metal arc welding process in all positions	Level 2	16	Draft - Prep for P Comment
core	243064 Weld carbon steel workpieces, using the gas metal arc welding process in all positions	Level2	15	Draft - Prep for P Comment
Core	243058 Weld carbon steel workpieces using the gas tungsten arc welding process in all positions	Level3	25	Draft - Prep for P Comment
Elective	8038 Operating lift trucks	Level3	6	Reregistered
Elective	8039 Operating cranes	Level3	10	Registered
Elective	9533 Use communication skills to handle and resolve conflict in the workplace	Level3	3	Reregistered
Elective	12457 Develop learning strategies and techniques	Level3	3	Registered
Elective	14695 Remove material with the shields metal arc gouging process	Level3	8	Registered
Elective	243077 Cut material using the oxy-fuel pipe cutting device	Level3	3	Draft - Prep for P Comment
Elective	243078 Perform destructive testing on welded specimens	Level 3	5	Draft - Prep for P Comment
Elective	243080 Cut material using the oxy-fuel profile cutting machine	Level3	5	Draft - Prep for P Comment
Elective	243081 Cut material using the oxy-fuel straight–line cutting machine	Level3	3	Draft - Prep for P Comment
Elective	243086 Draw and interpret complex plate, pipe and structural steel plate, pipe and	Level3	6	Draft - Prep for P
Fundamental	116937 Use a Graphical User Interface (GUI)-based spreadsheet application to mate and edit spreadsheets	Level2	4	Registered
Fundamental	7456 Use mathematics to investigate and monitor the financial aspects of personal, business and national issues	Level3	5	Reregistered
Fundamental	9528 Communicate with clients	Level3	3	Reregistered
Fundamental	12488 Complete feasibility and commissioning reports	Level3	3	Registered
Fundamental	119457 Interpret and use information from texts	Level3	5	Registered

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 1

Weld carbon steel workpieces using the cored-wire welding process in all positions

SAQA US ID	*UNIT STANDARD TITLE*
243052	Weld carbon steel workpieces using the cored-wire welding process in all positions

SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		*6*	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	*8*	Level 3	Regular

***SPECIFIC OUTCOME* 1**

Describe the cored-wire welding process.

SPECIFIC OUTCOME 2

Select, set up and conduct pre-operational checks.

***SPECIFIC OUTCOME* 3**

Prepare workpieces prior to welding.

***SPECIFIC OUTCOME* 4**

Weld workpieces.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 2

Weld carbon steel workpieces using the oxy-acetylene gas welding process in all positions

SAQA US ID	*UNIT STANDARD TITLE*
243053	Weld carbon steel workpieces using the oxy-acetylene gas welding process in all positions

SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		*6*	
UNIT STANDARD N P E		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	10	Level 3	Regular

SPECIFIC OUTCOME 1

Describe and explain the oxy-acetylene gas welding process.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre operational checks of oxy-acetylene gas welding equipment.

SPECIFIC OUTCOME 3

Prepare workpieces prior to welding.

SPECIFIC OUTCOME 4

Weld metals with oxy-acetylene gas welding process.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **3**

Weld carbon steel workpieces using the gas tungsten arc welding process in all positions

SAQA US ID	*UNIT STANDARD TITLE*
243058	Weld carbon steel workpieces using the gas tungsten arc welding process in all positions

SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		*6*	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	*25*	Level 3	Regular

SPECIFIC OUTCOME 1

Describe and explain the gas tungsten arc welding process.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre-operational checks of gas tungsten arc welding equipment.

SPECIFIC OUTCOME 3

Prepare workpieces prior to welding.

SPECIFIC OUTCOME 4

Weld workpieces.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **4**

SAQA US ID	*UNIT STANDARD TITLE*		
243059	Weld workpieces in the stainless steel material group, using the gas metal arc welding process in all positions		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		***6***	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Manufacturing and Assembly
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	10	Level **4**	Regular

SPECIFIC OUTCOME 1

Describe and assemble gas metal arc welding equipment.

SPECIFIC OUTCOME 2

Select, correctly assemble and conduct pre-operational checks of gas metal arc welding equipment.

SPECIFIC OUTCOME 3

Prepare workpiece prior to welding.

SPECIFIC OUTCOME 4

Weld workpiece.

SPECIFIC OUTCOME 5

Inspect welded workpiece.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **5**

Weld carbon steel workpieces using the gas tungsten arc welding process in the downhand position

SAQA US ID	*UNIT STANDARD TITLE*
243068	Weld carbon steel workpieces using the gas tungsten arc welding process in the downhand position

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding	*6*	

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

ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	15	Level 3	Regular

SPECIFIC OUTCOME 1

Describe and explain the **gas** tungsten arc welding process.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre-operational checks of gas tungsten arc welding equipment.

SPECIFIC OUTCOME 3

Prepare workpieces prior to welding.

SPECIFIC OUTCOME **4**

Weld workpieces.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **6**

SAQA US ID	*UNIT STANDARD TITLE*		
243077	Cut material using the oxy-fuel pipe cutting device		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		***6***	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	**3**	Level ***3***	Regular

SPECIFIC OUTCOME 1

Describe and explain the oxy-fuel pipe cutting process.

SPECIFIC OUTCOME 2

Prepare for the oxy-fuel cutting operation.

SPECIFIC OUTCOME 3

Cut pipe to job requirements.

SPECIFIC OUTCOME 4

Inspect the completed cut.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 7

Perform destructive testing on welded specimens

SAQA US ID	***UNIT STANDARD TITLE***		
243078	Perform destructive testing on welded specimens		
SGB NAME		***ORGANISING FIELD ID***	***PROVIDER NAME***
SGB Welding		***6***	
UNIT STANDARD TYPE		***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	***5***	Level 3	Regular

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: ***8***

Cut material using the oxy-fuel profile cutting machine

SAQA US ID	***UNIT STANDARD TITLE***		
243080	Cut material using the oxy-fuel profile cutting machine		
SGB NAME		***ORGANISING FIELD ID***	***PROVIDER NAME***
SGB Welding		6	
UNIT STANDARD TYPE		***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	5	Level 3	Regular

SPECIFIC OUTCOME 1

Describe and explain the oxy-fuel profile cutting process of carbon steel.

SPECIFIC OUTCOME 2

Prepare for the oxy-fuel cutting operation.

SPECIFIC OUTCOME 3

Cut material to job requirements.

SPECIFIC OUTCOME 4

Inspect the completed cut.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **9**

SAQA US ID	***UNIT STANDARD TITLE***
243081	Cut material using the oxy-fuel straight-line cutting machine

SGB NAME	***ORGANISING FIELD ID***	***PROVIDER NAME***
SGB Welding	***6***	
UNIT STANDARD TYPE	***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design

ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	***3***	Level ***3***	Regular

SPECIFIC OUTCOME 1

Describe and explain the oxy-fuel straight-line cutting process of carbon steel.

SPECIFIC OUTCOME **2**

Prepare for the oxy-fuel cutting operation.

SPECIFIC OUTCOME **3**

Cut material to job requirements.

SPECIFIC OUTCOME **4**

Inspect the completed cut.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 10

Draw and interpret complex plate, pipe and structural steel plate, pipe and structural steel drawings

SAQA US ID	*UNIT STANDARD TITLE*		
243086	Draw and interpret complex plate, pipe and structural steel plate, pipe and structural steel drawings		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		6	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	6	Level 3	Regular

SPECIFIC OUTCOME 1

Demonstrate methods of construction to produce complex plate and structural steel drawings and sketches.

SPECIFIC OUTCOME 2

Develop cylinders and cylindrical segments.

SPECIFIC OUTCOME 3

Develop cones-, pyramid- and sphere-segments.

SPECIFIC OUTCOME 4

Produce form-to-form (transformer) developments by triangulation.

SPECIFIC OUTCOME 5

Describe structural steel detailing processes and related components.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 11

Weld workpieces within the aluminium material group, using the gas metal arc welding process in all positions

SAQA US ID	*UNIT STANDARD TITLE*
243089	Weld workpieces within the aluminium material group, using the gas metal arc welding process in all positions

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding	*6*	

UNIT STANDARD TYPE	*ORGANISING FIELD*	*BFIELD DESCRIPTION*
	1 fa t i Engineeri a l h g	and R lated De

ABET BAND		*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	10	el 4	Regular

SPECIFIC OUTCOME 1

Describe and assemble gas metal arc welding equipment.

SPECIFIC OUTCOME 2

Select, correctly assemble and conduct pre-operational checks of gas metal arc welding equipment.

SPECIFIC OUTCOME 3

Prepare workpiece prior to welding.

SPECIFIC OUTCOME 4

Weld workpiece.

SPECIFIC OUTCOME 5

Inspect welded workpiece.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA QUAL ID	*QUALIFICATION TITLE*		
57887	Further Education and Training Certificate: Welding Application and Practice		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		*6*	
QUAL TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD*
Further Ed and Training Cert		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUALIFICATION CLASS*
Undefined	158	Level **4**	Regular-Unit Stds Based

PURPOSE AND RATIONALE OF THE QUALIFICATION

Purpose:

The purpose of this Qualification is to provide learners, education and training providers and employers with the standards and the range of learning required to work effectively in the welding industry and to meet the challenges of such an environment.

This Qualification is the last of a progression, which culminates in the use of a range of complex welding methods. The purpose of this Qualification is to develop learners who, after completion, demonstrate the ability to:

> Use and apply a variety of plate and pipe welding processes according to performance standards.
> Participate in self-directed activity, by complying with welding procedures and maintaining business objectives.
> Demonstrate leadership through effective interaction and communication with clients, peers and members of supervisory and management levels.
> Range: Leadership (individual and team); problem solving; technical report writing; exploring options for further learning.

Welding knowledge, technique and reflexive skill play a role in this Qualification.

This Qualification requires that learners apply complex welding practice and theoretical knowledge within the following environments:

> Manufacture and Assembly.
> Chemical Plant Installations.
> Food Processing Plant Installations.
> Mining.
> Building and Construction.

Qualifying learners will also understand:

> Implementation and maintenance of business processes.
> Supervision of work units.
> The writing of technical reports.
> Communication and numeracy skills applicable at this level and appropriate to the work environment.

Rationale:

This is the third Qualification in a learning pathway for learners who want to follow establish a career in

welding. The qualification replaces the Further Education and Training Certificate: Welding Application and Practice (NQF Level 4) and the interimly registered qualification: Further Education and Training Certificate: Chemical Welder (NQF Level 4).

The welding industry operates in a competitive and challenging environment. The finished processes have to respond to a wide variety of exacting customer and consumer requirements. In addition, the industry has to respond to international competition and environmental issues.

Welding application and practice require joining and cutting of materials that meet national and international requirements. Welding generally requires the joining of material that is subjected to considerable stress when in operation and the welding process needs to be consistent and accurate.

This Qualification concludes the series of welding qualifications between NQF Level 2 to NQF Level 4.

There are opportunities for further development and a typical career progression may lead to:

> Quality Assurance, a career path and greater security of employment within the welding industry.

This Qualification enables learners who have gained relevant experience in the workplace to obtain credits through the RPL process. This Qualification also forms the basis for further development in the engineering sector, and in particular, the fabrication and welding industry in general.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

It is assumed that learners are already competent in Communication and Mathematical Literacy at NQF Level 3.

Recognition of Prior Learning:

This qualification can be obtained in part or wholly through the recognition of prior learning.

The learner should be thoroughly briefed on the mechanism to be used and support and guidance should be provided. Care should be taken that the mechanism used provides the learner with an opportunity to demonstrate competence and is not so onerous as to prevent learners from taking up the RPL option towards gaining a Qualification.

Access to the qualification:

Access to this qualification is open. However, it is preferable that learners have completed the National Certificate in Welding Application and Practice: NQF Level 3.

QUALIFICATION RULES

> All the Fundamental unit standards totalling 56 credits are compulsory.

> All the Core unit standards totalling 90 is compulsory.

> A minimum of 12 credits should be selected from the Electives.

EXIT LEVEL OUTCOMES

1. Use and apply a variety of plate and pipe welding processes according to performance standards.

2. Participate in self-directed activity, by complying with welding procedures and maintaining business objectives.

3. Demonstrate leadership through effective interaction and communication with clients, peers and members of supervisory and management levels.
> Range: Leadership (individual and team); problem solving; technical report writing: exploring options for further learning.

ASSOCIATED ASSESSMENT CRITERIA

1:
> Pipe welding techniques are applied in all positions and tested in accordance with performance standards.

> Welding processes are applied in accordance with performance standards.
> Range: Welding processes include shielded metal arc welding: gas metal arc welding; gas tungsten arc welding; cored-wire welding and oxy-fuel welding.

> Techniques of welding stainless and aluminium are applied and tested in accordance performance standards.
> Range: Auluminium includes plate.

> Safety practices and procedures are applied withing a fabrication and welding context.

> Welding machinery, tools and equipment, are cared for, cleaned and stored according to standard operating procedures.

> Work-pieces are assessed in accordance with performance qualification standards.

2:
> Quality assurance practices applicable to the fabrication and welding industry are monitored and controlled by ensuring compliance to specification procedures.

> Business processes are implemented and maintained, and deviations are critically interrogated and the findings are analysed.

> Prevantative and corrective measures are applied in accordance with organisational procedures.

3:
> Relationships with peers, supervisory and management levels are established and leadership is demonstrated by assertive communication and behaviour within the workplace.

> Correct technical information is communicated using written reports.

> Problems are identified and are resolved by implementing corrective action.

> Learning opportunities and preparation requirements are identified and a learning plan is developed.

Integrated assessment:

Integrated assessment during, this qualification provides an opportunity for learners to show they are able to integrate life skills and values achieved across a range of unit standards and contexts, with the added practical orientation gained at this level.

Integrated assessment must evaluate the quality of observable performance as well as the thinking behind the performance.

Some assessment aspects will demand practical demonstration while others may not. In some cases inference will be necessary to determine competence depending on the nature and context within which performance takes place.

Assessors will collect evidence of the learner's competence by:

> Observing the learner at work (both in primary activities as well as other interactions) or by relevant simulations.
> Asking questions and initiating short discussions to test understanding.
> Looking at records and reports.

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 on the approach being taken.

Since this is an intermediate level qualification, it is necessary to ensure that the life skills part of the qualification is also targeted to ensure that while the competence may have been achieved in the skills context, learners are able to apply it in a range of other contexts and for further learning, emphasizing leadership and responsibility. The assessment should also ensure that the Critical Cross-Field Outcomes have been achieved.

INTERNATIONAL COMPARABILITY

Internationalcomparability in welding programmes has two divergent categories:

> Comparative education and training content, at a specific levels within the context of the South African National Qualifications Framework (NQF).
> Comparative quality assurance standards for international qualification, certification and licensing.

> Comparative education and training content:

It must be stated from the outset of this statement that reference to international benchmarking for this qualification series, applies only to the education and training content at specific levels between NQF 2, 3 and 4 and its measure of "appropriateness"when compared with welder training programmes internationally.

International benchmarking was done against the contents of the International Welder Qualification as specified and prepared by the InternationalAuthorisation Board (IAB Group A, WG A3A; IAB-089-2003/EWF-452-467-480-481 Rev.3 - January 2005; expires 31st December 2007). This benchmarking was done in order to align the education and training content of this Qualification Series: National Certificate in Welding Application and Practice NQF 2 and 3 and Further Education and Training Certificate NQF 4, according to international standards.

The comparison with the training approach advocated by the International Welding Institute (IIW) through its "Bratislava Agreement" is particularly valuable, since they also lead to a European Community (EC) standard for Welding, making the InternationalWelder Diploma equivalent to the European Welder Diploma. Participants in the "Bratislava Agreement" include the South African Institute of Welding (SAIW).

This exercise also included an investigation into the American (USA) Welding Society's (AWS) approach to introductory, intermediate and advanced education and training programmes related to welding.

African countries with manufacturing and engineering infrastructure (including SADC countries) were scanned for applicable qualifications or training programmes, but no relevant qualifications are offered in any of these countries.

Good international comparability, including similar core qualification structures and progressions from NQF Level 2 to NQF Level 3, were found in the Australian, New Zealand, British and Scottish qualifications.

A direct comparison with these international qualifications indicates that the education and training focus of all the qualifications is basically the same. The reference to level descriptors differ, in order to accommodate the NQF and outcomes-based education approach. This qualification series therefore makes an attempt at equating the education and training content of the three international skills levels by creating three distinct South African (NQF) welding qualifications, viz:

> International fillet welder - National Certificate in Welding Application and Practice NQF 2.
> International plate welder - National Certificate in Welding Application and Practice NQF 3.
> International pipe welder - Further Education and Training Certificate in Welding Application and Practice NQF 4.

> Comparative quality assurance standards:

This qualification series differs from the international qualification benchmark, in that it does not require the welded work of learners to be quality assured according to the criteria specified by ISO 9606 (or equivalent) qualification tests. Learners may be found competent in accordance with the assessment criteria of the applicable SAQA-registered unit standard after being quality-assured by the presiding ETQA.

Due to the wide reference list of international standards (Welding Code Specifications), an open range statement has been developed for those learning outcomes which refer to "Inspect the welded workpiece".

Range statement: ".....Welded joints acceptance criteria to be in accordance with national and/or internationalwelding standards", refers to:

> American Welding Society (AWS):
> AWS D1.I Structural Welding Code Steel.
> AWS D1.2 Structural Welding Code Aluminium.
> AWS D1.3 Structural Welding Code Sheet Steel.
> AWS D1.4 Structural Welding Code Reinforcing Steel.
> AWS D1.5 Bridge Welding Code.
> AWS D10.9 Welding Code for Pipe and Tubing.

> American Society of Mechanical Engineers (ASME)/ASME Section IX Boiler & Pressure Vessel Code.

> American Petroleum Institute (API)/Standard 1104 for Welding Pipe Lines and Related Facilities.

> British Standard (BS):
> BS 4870 Approval Testing of Welding Procedures.
> BS 4871 Approval Testing Of Welders Working To Approved Welding Procedures.
> BS 4872 Approval Testing Of Welders When Welding Procedure Approval Is Not Required.

> International Standard Organization (ISO):
> ISO 9606 -1 Approval Testing of Welders - Fusion Welding Part 1: Steel.

This Welding Qualification compares well with the best international qualifications and training programmes offered. The additional operational content incorporated in the qualification will serve to support qualifying learners to make better informed, autonomous decisions within a more expansive timeframe than international learners.

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 welding Qualifications may be evaluated against this Qualification for the purpose of RPL.

Horizontal articulation:

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

> Core learning at this level applies to equivalent credit accrual for some unit standards in the following qualifications at NQF Level 4:
> 22871: National Certificate: Engineering Fabrication (light or heavy).
> 23275: National Certificate: Mechanical Engineering: Fitting.
> 23279: National Certificate: Mechanical Engineering: Machining.
> 23281: National Certificate: Mechanical Engineering: Tooling Manufacture.

Vertical articulation:

> Successful learners having attained the Further Education and Training Certificate: Welding Application and Practice, may advance to:
> 49061: National Certificate: Master Craftsmanship (Electrical), NQF Level 5.
Or:
> 49059: National Diploma: Master Craftsmanship (Electrical), NQF Level 5.

MODERATION OPTIONS

> Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with an appropriate 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 ETQA or with an ETQA that has a Memorandum of Understanding with the relevant ETQA.

> Moderation of assessment will be overseen by the relevant ETQA or by an ETQA that has a Memorandum of Understanding with the relevant ETQA, according to the ETQAs policies and guidelines for assessment and moderation.

> Moderation must include both internal and external moderation of assessments at exit points of the Qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual Unit Standards as well as in the exit level outcomes described in the Qualification.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

The following criteria should be applied by the relevant ETQA:

> Appropriate Qualification in the field of welding application and practice at NQF level 5 and a minimum of 2 years experience in the welding industry.

> Registration as an assessor with the relevant ETQA.

NOTES

This qualification replaces qualification 24216, "National Certificate: Welding Application and Practice", Level 4, 169 credits.

This submission is the product of the combined review process of the following qualifications:

> 24216: National Certificate: Welding Application and Practice, NQF Level 4 (SAQA 0151103 on 03 December 2003).
And:
> 13632: Mechanics: Chemical Welding, NQF Level 4 (Interim-regd.).

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

	UNIT STANDARD ID AND TITLE	LEVEL	CREDITS	STATUS
/core	**243049** Weld carbon steel pipe using the cored-wire welding process in all positions	Level 4	10	Draft - Prep for P Comment
Core	**243054** Weld carbon steel pipe, using the gas tungsten arc welding process in all positions	Level 4	20	Draft - Prep for P Comment
Core	**243057** Weld workpieces within the stainless steel material group, using the gas tunosten arc welding process in all positions	Level 4	10	Draft - Prep for P Comment
Core	**243059** Weld workpieces in the stainless steel material group, using the gas metal arc welding process in all positions	Level 4	10	Draft - Prep for P Comment
/Core	**243062** Weld carbon steel pipe, using the shielded metal arc welding process in all positions	Level 4	20	Draft - Prep for P Comment
Core	**243079** Weld workpieces within the aluminium material group, using the gas tungsten arc welding process in all positions	Level 4	10	Draft - Prep for P Comment
Core	**243089** Weld workpieces within the aluminium material group, using the gas metal arc welding process in all positions	Level 4	10	Draft - Prep for P Comment
Elective	**10981** Supervise work unit to achieve work unit objectives (individuals and teams)	Level 4	12	Reregistered
Elective	**13254** Contribute to the implementation and maintenance of business processes	Level 4	10	Registered
Elective	**14473** Develop and produce computer aided drawings	Level 4	4	Reregistered
/Elective	**14497** Identify, interpret and produce working structural steel drawings	Level 4	8	Registered
Elective	**14698** Cut materials using plasma cutting	Level 4	4	Registered
Elective	**14721** Weld pipe with oxy-acetylene gas process	Level 4	20	Registered
Elective	**114194** Demonstrate understanding of regulations codes and drawing office practices for structural steel detailing	Level 4	7	Registered
Elective	**243050** Weld pipe within the stainless steel material group, using the gas tungsten arc welding process in all positions	Level 4	20	Draft - Prep for P Comment
Elective	**243051** Weld steel workpieces, using the plasma arc welding process in all positions	Level 4	20	Draft - Prep for P Comment
Elective	**243060** Weld pipe within the stainless steel material group, using the gas metal arc welding process in all positions	Level 4	20	Draft - Prep for P Comment
Elective	**243065** Weld carbon steel pipe using the gas metal arc welding process in all positions	Level 4	20	Draft - Prep for P Comment
/Elective	**243070** Programme, use and maintain an industrial robot system	Level 4	10	Draft - Prep for P Comment
Elective	**243083** Weld pipe within the aluminium material group, using the gas metal arc welding process in all positions	Level 4	20	Draft - Prep for P Comment
Elective	**243085** Weld carbon steel workpieces, using the shielded metal arc and gas tungsten arc combination welding processes, in all positions	Level 4	8	Draft - Prep for P Comment
Elective	**243087** Weld pipe within the aluminium material group, using the gas tungsten arc welding process in all positions	Level 4	20	Draft - Prep for P Comment
Elective	**243088** Weld carbon steel pipe, with combination welding processes using the gas tungsten arc welding and gas metal arc welding, in all positions	Level 4	8	Draft - Prep for P Comment
Fundamental	**119457** Interpret and use information from texts	Level 3	5	Registered
Fundamental	**119458** Anaiyse and respond to a variety of literary texts	Level 3	5	Registered
Fundamental	**119466** Interpret a variety of literary texts	Level 3	5	Registered
Fundamental	**119472** Accommodate audience and context needs in oral/signed communication	Level 3	5	Registered

/Fundamental	7468 Use mathematics to investigate and monitor the financial aspects of personal, business, national and international issues	Level 4	6	Reregistered
Fundamental	9015 Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life related problems	Level 4	6	Reregistered
Fundamental	9016 Represent analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts	Level 4	4	Reregistered
Fundamental	119459 Write/present/sign for a wide range of contexts	Level 4	5	Registered
Fundamental	119462 Engage in sustained oral/signed communication and evaluate spoken/signed texts	Level 4	5	Registered
Fundamental	119469 Read/view, analyse and respond to a variety of texts	Level 4	5	Registered
Fundamental	119471 Use language and communication in occupational learning programmes	Level 4	5	Registered

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

		ORGANISING FIELD DESCRIPTION	
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	10	Level 4	Regular

SPECIFIC OUTCOME 2

Select, set up and conduct pre-operational checks.

SPECIFIC OUTCOME 3

Prepare pipe prior to welding.

SPECIFIC OUTCOME 4

Weld pipe.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 2

SAQA US ID	*UNIT STANDARD TITLE*
243050	Weld pipe within the stainless steel material group, using the gas tungsten arc welding process in all positions

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding	*6*	
UNIT STANDARD TYPE	***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular	Manufacturing Engineering and Technology	Engineering and Related Design

ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	**20**	Level **4**	Regular

SPECIFIC OUTCOME 1

Describe and assemble gas tungsten arc welding equipment.

SPECIFIC OUTCOME 2

Select, correctly assemble and conduct preoperational checks of gas tungsten arc welding equipment.

SPECIFIC OUTCOME 3

Prepare pipes prior to welding.

SPECIFIC OUTCOME 4

Weld pipes.

SPECIFIC OUTCOME 5

Inspect welded pipe.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **3**

Weld steel workpieces, using the plasma arc welding process in all positions

243051	Weld steel workpieces, using the plasma arc welding process in all positions		
SGB NAME		***ORGANISING FIELD ID***	***PROVIDER NAME***
SGB Welding		***6***	
UNIT STANDARD TYPE		***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Manufacturing and Assembly
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	***20***	Level 4	Regular

SPECIFIC OUTCOME 1

Describe and explain the plasma arc welding equipment.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre-operational checks of plasma arc welding equipment.

SPECIFIC OUTCOME 3

Prepare workpiece prior to welding.

SPECIFIC OUTCOME 4

Weld workpiece.

SPECIFIC OUTCOME 5

Inspect welded plate for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **4**

Weld carbon steel pipe, using the gas tungsten arc welding process in all positions

SAQA US ID	*UNIT STANDARD TITLE*		
243054	Weld carbon steel pipe, using the gas tungsten arc welding process in all positions		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		**6**	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	20	Level 4	Regular

SPECIFIC OUTCOME 1

Describe and assemble gas tungsten arc welding equipment.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre-operational checks of gas tungsten arc welding equipment.

SPECIFIC OUTCOME 3

Prepare pipes prior to welding.

SPECIFIC OUTCOME 4

Weld pipes.

SPECIFIC OUTCOME 5

inspect welded pipe for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumabies and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **5**

SAQA US ID	*UNIT STANDARD TITLE*	
243057	Weld workpieces within the stainless steel material group, using the gas tungsten arc welding process in all positions	
SGB NAME	***ORGANISING FIELD ID***	***PROVIDER NAME***
SGB Welding	***6***	
UNIT STANDARD TYPE	***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular	Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND (CREDITS	***NQF LEVEL***	***UNIT STANDARD TYPE***
	4	

SPECIFIC OUTCOME 1

Describe and assemble gas tungsten arc welding equipment.

SPECIFIC OUTCOME 2

Select, correctly assemble and conduct pre-operational checks of gas tungsten arc welding equipment.

SPECIFIC OUTCOME 3

Prepare workpieces prior to welding.

SPECIFIC OUTCOME 4

Weld the workpiece.

SPECIFIC OUTCOME 5

Inspect welded workpiece.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 6

SAQA US ID	*UNIT STANDARD TITLE*
243060	Weld pipe within the stainless steel material group, using the gas metal arc welding process in all positions

SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		**6**	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	20	Level **4**	Regular

SPECIFIC OUTCOME 1

Describe and assemble gas metal arc welding equipment.

SPECIFIC OUTCOME 2

Select, correctly assemble and conduct pre-operational checks of gas metal arc welding equipment.

SPECIFIC OUTCOME 3

Prepare pipes prior to welding.

SPECIFIC OUTCOME 4

Weld pipes.

SPECIFIC OUTCOME 5

Inspect welded pipe.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 7

SAQA US ID	*UNIT STANDARD TITLE*		
243062	Weld carbon steel pipe, using the shielded metal arc welding process in all positions		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		6	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	*20*	Level **4**	Regular

SPECIFIC OUTCOME 1

Describe the shielded metal arc welding process and related equipment.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre-operational checks of shielded metal arc welding equipment.

SPECIFIC OUTCOME 3

Prepare pipes prior to welding.

SPECIFIC OUTCOME 4

Weld pipes.

SPECIFIC OUTCOME 5

Inspect welded pipe for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **8**

SAQA US ID	*UNIT STANDARD TITLE*		
243065	Weld carbon steel pipe using the gas metal arc welding process in all positions		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		*6*	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*[UNIT STANDARD TYPE*
Undefined	20	Level **4**	Regular

SPECIFIC OUTCOME 1

Describe and explain the gas metal arc welding process.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre-operational checks of gas metal arc welding equipment.

SPECIFIC OUTCOME 3

Prepare pipes prior to welding.

SPECIFIC OUTCOME 4

Weld pipes.

SPECIFIC OUTCOME 5

Inspect welded pipe for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **9**

Programme, use and maintain an industrial robot system

SAQA US ID	*UNIT STANDARD TITLE*
243070	Programme, use and maintain an industrial robot system

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding	**6**	

UNIT STANDARD TYPE	*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular	Manufacturing, Engineering and Technology	Manufacturing and Assembly

ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	10	Level **4**	Regular

SPECIFIC OUTCOME 1

Demonstrate an understanding of and an ability to apply the relevant robot safety.

SPECIFIC OUTCOME 2

Identify and explain the function of the various parts of an industrial robot.

SPECIFIC OUTCOME 3

Demonstrate an understanding of and an ability to use the handheld teach pendant.

SPECIFIC OUTCOME 4

Demonstrate an understanding of and an ability to maintain the manipulator.

SPECIFIC OUTCOME 5

Remove and install in-line wrist, toothed belts and motor units.

SPECIFIC OUTCOME 6

Programme the industrial robot using simple motion programmes.

SPECIFIC OUTCOME 7

Run and test industrial robot motion programmes.

SPECIFIC OUTCOME 8

Record information on work done.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 10

SAQA US ID	***UNIT STANDARD TITLE***		
243079	Weld workpieces within the aluminium material group, using the gas tungsten arc welding process in all positions.		
SGB Welding		**6**	
UNIT STANDARD TYPE		***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	10	Level 4	Regular

SPECIFIC OUTCOME 1

Describe and assemble gas tungsten arc welding equipment.

SPECIFIC OUTCOME 2

Select, correctly assemble and conduct preoperational checks of gas tungsten arc welding equipment.

SPECIFIC OUTCOME 3

Prepare work piece prior to welding.

SPECIFIC OUTCOME 4

Weld workpiece.

SPECIFIC OUTCOME 5

Inspect welded workpiece.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **11**

SAQA US ID	*UNIT STANDARD TITLE*		
243083	Weld pipe within the aluminium material group, using the gas metal arc welding process in all positions		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		*6*	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	20	Level 4	Regular

SPECIFIC OUTCOME 1

Describe and assemble gas metal arc welding equipment.

SPECIFIC OUTCOME 2

Select, correctly assemble and conduct pre-operational checks of gas metal ***arc*** welding equipment.

SPECIFIC OUTCOME 3

Prepare pipes prior to welding.

SPECIFIC OUTCOME **4**

Weld pipes.

SPECIFIC OUTCOME 5

Inspect welded pipe.

SPECIFIC OUTCOME 6

Care for and store welding consumabies and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

SAQA US ID	UNIT STANDARD TITLE
243085	Weld carbon steel workpieces, using the shielded metal arc and gas tungsten arc combination welding processes, in all positions

SGB NAME	ORGANISING FIELD ID	PROVIDER NAME
SGB Welding	6	

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

ABET BAND	CREDITS	NQF LEVEL	UNIT STANDARD TYPE
Undefined	8	Level 4	Regular

SPECIFIC OUTCOME 1

Describe and explain the shielded metal arc and gas tungsten arc welding process.

SPECIFIC OUTCOME 2

Select, assemble and conduct pre-operational checks of shielded metal arc and gas tungsten arc weld.

SPECIFIC OUTCOME 3

Prepare workpiece prior to welding.

SPECIFIC OUTCOME 4

Weld workpiece.

SPECIFIC OUTCOME 5

Inspect welded workpiece for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **13**

SAQA US ID	*UNIT STANDARD TITLE*		
243087	Weld pipe within the aluminium material group, using the gas tungsten arc welding process in all positions		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		6	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	20	Level **4**	Regular

SPECIFIC OUTCOME 1

Describe and assemble gas.tungsten arc welding equipment.

SPECIFIC OUTCOME 2

Select, correctly assemble and conduct pre-operational checks of gas tungsten arc welding equipment.

SPECIFIC OUTCOME 3

Prepare pipes prior to welding.

SPECIFIC OUTCOME 4

Weld pipes.

SPECIFIC OUTCOME 5

Inspect welded pipe.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: **14**

SAQA US ID	*UNIT STANDARD TITLE*		
243088	Weld carbon steel pipe, with combination welding processes using the gas tungsten arc welding and gas metal arc welding, in all positions		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Welding		6	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing Engineering and Technology	Engineering and Related Design
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	**8**	Level **4**	Regular

SPECIFIC OUTCOME 1

Describe and explain the gas tungsten arc and gas metal arc welding equipment.

SPECIFIC OUTCOME 2

Select, assemble & conduct pre-operational checks of gas tungsten and gas metal arc welding equipment.

SPECIFIC OUTCOME 3

Prepare pipes prior to welding.

SPECIFIC OUTCOME 4

Weld pipes.

SPECIFIC OUTCOME 5

Inspect welded pipe for defects.

SPECIFIC OUTCOME 6

Care for and store welding consumables and equipment.