No. 1182 **20 September 2002**

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

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

Manufacturing and Assembly

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

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the qualification and unit standards upon which qualifications are based. The full qualification and unit standards can be accessed via the SAQA web-site at **www.saqa.org.za**. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, 659 Pienaar street, Brooklyn, Pretoria.

Comment on the unit standards should reach SAQA at the address ***below and no later than 21 October 2002.*** All correspondence should be marked **Standards Setting – SGB for Manufacturing and Assembly** and addressed to

The Director: Standards Setting and Development
SAQA
Attention: Mr. D Mphuthing
Postnet Suite 248
Private Bag X06
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pp **SAMUEL B.A. ISAACS**
EXECUTIVE OFFICER

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

National Certificate in Engineering Fabrication (Light OR Heavy): NQF Level 3

Field: Manufacturing, engineering and technology - NSB 06

Sub-field: Manufacturing & assembly

Level: 3
Credit: 151
Issue date:
Review date:

Rationale of the qualification:

This qualification is the second in a series for learners who want to follow a career in the field of engineering fabrication, which includes boilermaking, sheetmetal working and vehicle body building. This qualification is for learners who want to specialise in light OR heavy fabrication within the context of boilermaking, sheetmetal working or vehicle body building, and it focuses on developing skills and knowledge necessary to progress in such a career. It enables learners who have gained relevant experience in the workplace to gain credits through the RPL process. The qualification also forms the basis for further learning in the field of engineering fabrication where the learner will be able to specialise in light OR heavy fabrication at NQF Level 4.

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 various industries making use of engineering fabrication (light OR heavy) and to meet the challenges of such an environment.

The chief skill that is recognised in this qualification is the ability to produce components of some complexity using a variety of fabrication methods. This capability requires an understanding of, and the ability to, lay out and mark off shapes; set up and use powered machinery; develop and fabricate from drawings and sketches and cut and join components. Hand skills play a vital role in this qualification.

Qualifying learners will be able to relate what they are doing to scientific principles and concepts. They will also be able to maintain and support the various policies and procedures related to the safety, health, environment and quality systems that govern their workplace.

Access to the Qualification:

Open access

This qualification series recognises skills, knowledge and values relevant to a workplace. It is designed for learners who:

- Have attended courses and then apply the knowledge gained to activities in the workplace
- Are already workers and have acquired the skills and knowledge without attending formal courses
- Are part of a learnership programme which integrates structured learning and work experience.

Learning assumed to be in place:

This qualification assumes learners have a National Certificate in Engineering Fabrication (Level 2). If the learner does not already have such a qualification, learning in preparation for this qualification would also have to include:

- Language and maths beyond basic literacy and numeracy
- Basic concepts of science and technology related to fabrication methods, engineering materials, tools and machines used in the fabrication process
- An ability to produce simple components using a variety of fabrication methods
- An ability to perform routine maintenance on machinery
- Concepts of organising factors in labour, business and the economy
- Role and purpose of procedures related to workplace relationships, roles and responsibilities

Exit Level Outcomes and Assessment Criteria:

Exit level outcome 1

Demonstrate an ability to produce components of some complexity using a variety of fabrication methods and operations, meeting output requirements and working safely with due care for fellow workers and the environment.

Associated Assessment Criteria

- Output and quality requirements are met
- Fabrication time limits are adhered to
- Safe working practices are adhered to
- Can respond to questions and discuss issues related to the theoretical principles of fabrication and the various fabrication methods and their respective operations at this level

Exit level outcome 2

Demonstrate an ability to read, interpret and produce detailed plating and structural steel drawings.

Associated Assessment Criteria

- Components and assemblies to be fabricated are identified and requirements are interpreted from drawing
- Drawing is produced to meet job requirements
- Material list is compiled

Exit level outcome 3

Demonstrate an ability to select and apply appropriate inspection methods to determine component compliance with specifications.

Associated Assessment Criteria

- Appropriate inspection methods are chosen and applied
- Can respond to questions and discuss issues related to various inspection methods and procedures and the principles underpinning such methods

Exit level outcome 4

Select appropriate procedures to solve familiar problems within a fabrication environment and operate within clearly defined contexts, with some scope for personal decision-making and responsibility.

Associated Assessment Criteria

- Appropriate procedures are selected to solve problems in an efficient and effective manner
- Unfamiliar problems are accurately reported to appropriate personnel
- Can respond to questions and discuss issues related to familiar problems in the fabrication of components and assemblies

Exit level outcome 5

Contribute to workgroup efforts and support the maintenance of a safe, effective and efficient workplace

Associated Assessment Criteria

- Production schedules and assignments are met
- Production workflow is managed efficiently
- Safe working practices are adhered to
- Workgroup goals are met
- Assistance and support is provided where required
- Active participation in workgroup discussions, in workgroup problem solving activities and in the implementation of solutions
- Relevant information is received and passed on

Exit level outcome 6

Demonstrate the ability to communicate with peers and members of supervisory / management levels and to use information gathered and summarised from a range of sources to produce simple written reports

Associated Assessment Criteria

- Information is gathered from a range of sources and accurately summarised
- Information is clearly presented in a timely manner in the required format to appropriate parties
- Relationships with peers and supervisory / management levels are established and functioning

Exit level outcome 6

Demonstrate an understanding of options for further learning in this or a related field of learning and preparation requirements for such learning.

Associated Assessment Criteria

- Options are explained
- Preparation requirements are explained

International comparability

Other, similar outcomes-based qualifications, certificates or skills standards in New Zealand and the United Kingdom have been used extensively to inform this qualification and its associated standards, and it compares favourably with them.

Integrated Assessment:

Integrated assessment at the level of the qualification provides an opportunity for learners to show they are able to integrate concepts, actions and ideas achieved across a range of unit standards and contexts. Integrated assessment must evaluate the quality of observable performance as well as the thinking behind the performance.

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.

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 all the critical crossfield outcomes have been achieved

Recognition of prior learning:

This qualification may be obtained through a process of RPL. This qualification may be obtained through RPL. 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.

Articulation possibilities:

The qualification has been designed and structured so that qualifying learners can move from one context to another. Employers or institutions should be able to evaluate the outcomes of this qualification against the needs of their context and structure top-up learning appropriately. Equally, holders of other qualifications may be evaluated against this qualification for the purpose of RPL

Moderation Options:

- Anyone assessing a learner against this qualification must be registered as an assessor with the relevant ETQA
- Any institution or learning provider offering learning towards the achievement of this qualification should be accredited as a provider with the relevant ETQA
- Moderation of assessment should be overseen by the relevant ETQA according to the moderation guidelines provided for in this qualification as well as the agreed ETQA guidelines

Criteria for registration of assessors

The following criteria should be applied by the relevant ETQA:

1. Appropriate qualification in the field of engineering fabrication and a minimum of two years' experience in a light / heavy fabrication environment. The subject matter experience of the assessor can be established by recognition of prior learning
2. Appropriate experience and understanding of assessment theory, processes and practices
3. Good interpersonal skills and the ability to balance the conflicting requirements of:
   - Maintaining national standards
   - The interests of the learner
   - The need for transformation and redressing the legacies of the past
   - The cultural background and language of the learner
4. Registration as an assessor with the MERS ETQA or any other relevant ETQA
5. Any other criteria required by the MERS ETQA or any other relevant ETQA

NATIONAL CERTIFICATE IN ENGINEERING FABRICATION (LIGHT OR HEAVY) – NQF LEVEL 3

Level 3 Fundamental	Credits	NLRD ID	Level 3 Core	Credits	NLRD ID	Level 3 Elective Choice of:	Credits	NLRD ID
Communication			**Fabrication (Light OR Heavy)**			**Directly related to core**		
Accommodate audience and context needs in oral communication	5		Form and shape sheet, plate, pipe and structural sections using power machines	15		Weld workpieces with the gas metal arc welding process in the downhand position	20	
Interpret and use information from texts	5		Lay out and mark off regular and irregular fabrication shapes	25		Weld workpieces with the gas tungsten arc welding process in the downhand position	20	
Write texts for a range of communicative contexts	5		Mechanically cut, drill, punch and assemble fabrication materials using powered machinery	8		Remove metals using oxy-fuel and air-carbon arc gouging processes	4	
Complete feasibility and commissioning reports	3		Assemble and mechanically join sheet, plate, tube, pipe and steel sections	4		Operate lift trucks	6	
Communicate with clients	3		Weld metals with the oxy-acetylene gas welding process in all positions	8		Operate cranes		
Mathematics			Weld workpieces with the shielded metal arc welding process in all positions	25		Other standards or additional learning related to the purpose of the qualification	10	
Use mathematics to investigate and monitor the financial aspects of personal and business issues	5		**Life Skills**			**Minimum elective credits required for qualification**		
Investigate life and work related problems using data and probabilities	5		Develop learning strategies and techniques	3			**12**	
Describe, apply and calculate shape and motion in 2- and 3-dimensional space in different contexts	4		**Business relations**					
Demonstrate understanding of the use of different number bases and measurement units and an awareness of error in the context of relevant calculations	2		Manage basic business finance	6				
			Manage work time effectively	3				

			Explain and use organizational procedures	6				
Total Fundamental	**36**		**Total Core**	**103**		**Total Elective**	**12**	
Total for qualification	**151**							

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

National Certificate in Engineering Fabrication (Light OR Heavy): NQF Level 4

Field: Manufacturing, engineering and technology - NSB 06

Sub-field: Manufacturing & assembly

Level: 4
Credit: 150
Issue date:
Review date:

Rationale of the qualification:

This is the third qualification in a series for learners who want to follow a career in the field of engineering fabrication, which includes boilermaking, sheetmetal working and vehicle body building. This qualification is for learners who want to specialise in light OR heavy fabrication within the context of boilermaking, sheetmetal working and vehicle body building, and it focuses on developing skills and knowledge necessary to progress in such a career.

It enables learners who have gained relevant experience in the workplace to gain credits through the RPL process. The qualification also forms the basis for further learning in the field of engineering fabrication within the higher education and training band.

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 various industries making use of engineering fabrication (light / heavy) and to meet the challenges of such an environment.

The chief skill that is recognised in this qualification is the ability to produce complex components using a variety of fabrication methods. This capability requires an understanding of, and the ability to, lay out and mark off shapes; set up and use powered machinery; develop and fabricate from complex drawings, and cut, assemble and join components using a variety of methods. This qualification also recognises the ability to co-ordinate teamwork. Hand skills play a vital role in this qualification.

Qualifying learners will be able to relate what they are doing to scientific principles and concepts. They will also be able to maintain and support the various policies and procedures related to the safety, health, environment and quality systems that govern their workplace.

Access to the Qualification:

Open access

How can I acquire the qualification?

This qualification series recognises skills, knowledge and values relevant to a workplace. It is designed for learners who:

- Have attended courses and then apply the knowledge gained to activities in the workplace
- Are already workers and have acquired the skills and knowledge without attending formal courses
- Are part of a learnership programme which integrates structured learning and work experience.

Learning assumed to be in place:

This qualification assumes learners have a National Certificate in Engineering Fabrication (Light OR Heavy) (NQF level 3). If the learner does not already have such a qualification, learning in preparation for this qualification would also have to include:

- Language and maths related to organising and controlling their environment
- An ability to weld components of some complexity using a variety of welding methods
- An ability to set up and assemble equipment and perform routine maintenance on equipment and machinery
- Concepts of organising factors in labour, business and the economy
- Role and purpose of procedures related to workplace relationships, roles and responsibilities

Exit Level Outcomes and Assessment Criteria:

Exit level outcome 1

Demonstrate an ability to produce complex components using a variety of fabrication methods and operations, meeting output requirements and working safely with due care for fellow workers and the environment.

Associated Assessment Criteria

- Output and quality requirements are met
- Fabrication time limits are adhered to
- Safe working practices are adhered to
- Can respond to questions and discuss issues related to the theoretical principles of fabrication and the various fabrication methods and their respective operations at this level

Exit level outcome 2

Demonstrate an ability to read, interpret and produce complex plating and structural steel drawings.

Associated Assessment Criteria

- Components and assemblies to be fabricated are identified and requirements are interpreted from drawing
- Drawing is produced to meet job requirements
- Material list is compiled

Exit level outcome 3

Demonstrate an understanding of quality specifications and an ability to interpret these and evaluate fabricated components to determine compliance with specifications.

Associated Assessment Criteria

- Quality specifications are interpreted and applied to fabricated components and compliance is determined and reported
- Can respond to questions and discuss issues related to quality specifications and the principles underpinning such methods

Exit level outcome 4

Maintain and support procedures to solve a variety of problems, both familiar and unfamiliar, within a welding context and operate within familiar and new situations, taking responsibility and making decisions.

Associated Assessment Criteria

- Solutions to welding-related problems are based on a clear analysis of information gathered through diagnostic procedures
- Procedures are modified to respond to unfamiliar problems where appropriate
- All actions related to problem solving are accurately recorded for future reference
- Can respond to questions and discuss issues related to familiar problems in the welding of components and assemblies

Exit level outcome 5

Co-ordinate work team, promoting the maintenance of a safe and efficient workplace, and developing the skills and performance of workgroup members.

Associated Assessment Criteria

- Production schedules and assignments are met
- Production workflow is managed efficiently
- Workgroup goals are met
- Provide leadership in workgroup discussions, in workgroup problem solving activities and in the implementation of solutions
- Relevant information is received, processed and passed on
- Workgroup members are supported, coached and influenced to work effectively, efficiently and safely

Exit level outcome 6

Communicate with peers and members of supervisory / management levels by producing simple written reports using information gathered and summarised from a range of sources.

Associated Assessment Criteria

- Information is gathered from a range of sources and accurately summarised
- Information is clearly presented in a timely manner in the required format to appropriate parties
- Relationships with peers and supervisory / management levels are established and functioning

Exit level outcome 7

Demonstrate the ability to communicate and present information clearly and reliably, and to analyse information in order to identify problems and determine trends.

Associated Assessment Criteria

- Conditions, evidence and incidences are reported accurately in a timely manner and discussed with peers and management
- Data gathered through diagnostic procedures is examined systematically and analysis is repeated until problem is solved
- Records are available for scrutiny and future reference

Exit level outcome 8

Demonstrate an understanding of options for further learning in this or a related field of learning and preparation requirements for such learning.

Associated Assessment Criteria

- Options are explained
- Preparation requirements are explained

International comparability

Other, similar outcomes-based qualifications, certificates and skills standards in New Zealand and the United Kingdom have been used extensively to inform this qualification and its associated standards, and it compares favourably with them.

Integrated Assessment:

Integrated assessment at the level of the qualification provides an opportunity for learners to show they are able to integrate concepts, actions and ideas achieved across a range of unit standards and contexts. Integrated assessment must evaluate the quality of observable performance as well as the thinking behind the performance.

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.

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 all the critical crossfield outcomes have been achieved.

Recognition of prior learning:

This qualification may be obtained through RPL. 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.

Articulation possibilities:

The qualification has been designed and structured so that qualifying learners can move from one context to another. Employers or institutions should be able to evaluate the outcomes of this qualification against the needs of their context and structure top-up learning appropriately.
Equally, holders of other qualifications may be evaluated against this qualification for the purpose of RPL.

Moderation Options:

- Anyone assessing a learner against this qualification must be registered as an assessor with the relevant ETQA
- Any institution or learning provider offering learning towards the achievement of this qualification should be accredited as a provider with the relevant ETQA
- Moderation of assessment should be overseen by the relevant ETQA according to the moderation guidelines provided for in this qualification as well as the agreed ETQA guidelines

Criteria for registration of assessors

The following criteria should be applied by the relevant ETQA:

1. Appropriate qualification in the field of engineering fabrication and a minimum of 2 years' experience in a light / heavy engineering fabrication environment. The subject matter experience of the assessor can be established by recognition of prior learning
2. Appropriate experience and understanding of assessment theory, processes and practices
3. Good inter-personal skills and the ability to balance the conflicting requirements of:
   - Maintaining national standards
   - The interests of the learner
   - The need for transformation and redressing the legacies of the past
   - The cultural background and language of the learner
4. Registration as an assessor with the MERS ETQA or any other relevant ETQA
5. Any other criteria required by the MERS ETQA or any other relevant ETQA

NATIONAL CERTIFICATE IN ENGINEERING FABRICATION (LIGHT OR HEAVY) – NQF LEVEL 4

Level 4 Fundamental	Credits	NLRD ID	Level 4 Core	Credits	NLRD ID	Level 4 Elective Choice of:	Credits	NLRD ID
Communication			**Fabrication (Light OR Heavy)**			**Directly related to core**		
Engage in sustained oral communication and evaluate spoken texts	5	8974	Develop and fabricate from complex drawings	28		Perform non-destructive tests on metal parts and components	6	
Read, analyse and respond to a variety of texts	5	8975	Cut, drill and punch, assemble and mechanically join structural steelwork	24		Test the physical properties of engineering metals	6	
Write for a wide range of contexts	5	8976	Weld workpieces with the shielded metal arc welding process in all positions	25		Weld workpieces with the gas metal arc welding process in all positions	15	
Write a technical report	4	9502	Perform heat treatment processes on engineering metals	8 (L3)		Weld workpieces with the gas tungsten arc welding process in all positions	20	
Communicate in an assertive manner with clients and fellow workers	4		**People interacting, leading and developing**			Remove metals using air-carbon arc gouging process	4 (L3)	
Mathematics			Lead a team, plan, allocate and assess their work	4		Use computer software to generate developments, reflecting the outcomes stated below	8	
Use mathematics to investigate and monitor the financial aspects of personal, business, and national issues	6	7468	**Business relations**			Develop a personal financial plan	2	
Apply knowledge of statistics and probability to critically interrogate	6	9015	Contribute to the implementation and maintenance of business processes	10		Other standards or additional learning related to the purpose of		

and effectively communicate findings on life related problems						the qualification		
Measure, estimate and calculate physical quantities and explore, critique and prove geometrical relationships in two and three-dimensional space in the life and workplace of the adult with increasing responsibilities	4					**Minimum elective credits required for qualification**	**12**	
Total Fundamental	**39**		**Total Core**	**99**		**Total Elective**	**12**	
Total for qualification	**150**							

NATIONAL CERTIFICATE IN ENGINEERING FABRICATION (LIGHT / HEAVY) – NQF LEVEL 4

Unit standards developed for this series of qualifications:

UNIT STANDARDS ON NQF LEVEL 4

CORE

Title 1: Develop and fabricate from complex drawings

Title 2: Cut, drill and punch, assemble and mechanically join structural steelwork

Title 3: Weld workpieces with the shielded metal arc welding process in all positions

ELECTIVE

Title 4: Weld workpieces with the gas metal arc welding process in all positions

Title 5: Weld workpieces with the gas tungsten arc welding process in all positions

UNIT STANDARD ON NQF LEVEL 3

ELECTIVE

Title 6: Remove metals using air-carbon arc gouging processes

UNIT STANDARDS AND SPECIFIC OUTCOMES IN NATIONAL CERTIFICATE IN ENGINEERING FABRICATION (LIGHT / HEAVY) – NQF LEVEL 4

Title 1: Develop and fabricate from complex drawings

Specific outcome 1.1: Prepare for laying out, marking off, and forming and shaping of materials

- Interpret job instructions and determine sequence of operations
- Check that equipment, tools and materials required are at the workstation
- Prepare equipment and tools for operation, including routine maintenance and preoperational checks
- Select materials
- Perform pattern calculations
- Determine lines of intersection
- Identify and note appropriate level marks
- Identify codes and standards in relation to dimensional accuracy
- Analyse material characteristics
- Perform calculations of force and leverage
- Identify hazards and take preventative action

Specific outcome 1.2: Mark out templates and patterns

- Make templates and patterns using X and Y co-ordinates
- Mark out heavy wall tube connections
- Produce templates for structural connections
- Establish and transfer datum points to materials

Specific outcome 1.3: Lay out and mark off structural sections

- Use structural section sketches to communicate job requirements to others in team
- Lay out structural connections
- Lay out and mark off pipe work
- Mark off section material

Specific outcome 1.4: Mark out surface developments

- Carry out pattern developments
- Carry out surface developments using neutral surface calculations
- Complete surface developments with allowances for joint preparation
- Generate right, oblique and transition patterns
- Inspect and measure surface development, templates and structural components for compliance

Specific outcome 1.5: Form and shape materials

- Set machines
- Carry out form and shape operations
- Dispose of waste material
- Store reusable materials
- Inspect and measure fabricated items for compliance to job specifications

Specific outcome 1.6: Identify and report non-conformances that cannot be rectified

Specific outcome 1.7: Record information on work done and provide feedback to appropriate personnel

Specific outcome 1.8 Apply safe working practices and discuss issues related to safety of self, fellow workers, machines, equipment, materials and the environment

Title 2: Cut, drill and punch, assemble and mechanically join structural steelwork

Specific outcome 2.1: Prepare for work activity

- Interpret job instructions and determine sequence of operations
- Select equipment and lubricants
- Prepare machines for operation, including routine maintenance and pre-operational checks

- Select and fit correct tooling
- Replace worn tooling, if required
- Set up machines
- Identify materials and verify material characteristics
- Select types of mechanical joining methods
- Identify potential hazards and take preventative action

Specific outcome 2.2: Perform mechanical cutting, drilling and punching of materials

- Determine cutting parameters
- Confirm blade clearances to achieve shearing
- Cut, drill and punch materials to specifications
- Dispose of waste materials
- Store reusable material
- Clean and restore work area

Specific outcome 2.3: Perform assembly and mechanical joining of materials

- Assemble materials
- Mechanically join materials
- Construct jigs and fixtures
- Perform site erection and layout
- Correct distortion
- Carry out finishing

Specific outcome 2.4: Apply quality checks

- Inspect and measure cut, drilled and punched materials for compliance to job specifications
- Inspect and measure assemblies and mechanical joints for compliance to job specifications

Specific outcome 2.5: Identify, document and rectify non-conformances and report non-rectifiable problems to appropriate personnel

Specific outcome 2.6: Record information on work done and provide feedback to appropriate personnel

Specific outcome 2.7: Apply safe working practices and discuss issues related to safety of self, fellow workers, machines, equipment, materials and the environment

Title 3: Weld workpieces with the shielded metal arc welding process in all positions

Specific outcome 3.1: Describe and assemble the shielded metal arc welding equipment

Specific outcome 3.2: Select, assemble and conduct pre operational checks of shielded metal arc welding equipment

Specific outcome 3.3: Prepare work pieces prior to welding
Specific outcome 3.4: Weld workpieces
Specific outcome 3.5: Inspect welded work piece
Specific outcome 3.6: Care and store welding consumables and equipment

Title 4: Weld workpieces with the gas metal arc welding process in all positions

Specific outcome 4.1: Describe the gas metal arc welding equipment
Specific outcome 4.2: Select, assemble and conduct pre operational checks of gas metal arc welding equipment
Specific outcome 4.3: Prepare work pieces prior to welding
Specific outcome 4.4: Weld workpieces
Specific outcome 4.5: Inspect welded work piece for defects in compliance with drawing specifications
Specific outcome 4.6: Care and store welding consumables and equipment

Title 5: Weld workpieces with the gas tungsten arc welding process in all positions

Specific outcome 5.1: Describe and explain the gas tungsten arc welding equipment
Specific outcome 5.2: Select, assemble and conduct pre operational checks of gas tungsten arc welding equipment
Specific outcome 5.3: Prepare work pieces prior to welding
Specific outcome 5.4: Weld workpieces
Specific outcome 5.5: Inspect welded work piece for defects
Specific outcome 5.6: Care and store welding consumables and equipment

Title 6: Remove metals using air-carbon arc gouging processes

Specific outcome 5.1: Describe and assemble the air-carbon arc gouging equipment
Specific outcome 5.2: Select, assemble and conduct pre operational checks on air-carbon arc gouging equipment
Specific outcome 5.3: Gouge workpieces
Specific outcome 5.4: Inspect gouged work pieces
Specific outcome 5.5: Care and store gouging consumables and equipment