education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATES (VOCATIONAL)

ASSESSMENT GUIDELINES

WELDING

NQF Level 2

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WELDING – LEVEL 2

CONTENTS

SECTION A: PURPOSE OF THE SUBJECT ASSESSMENT GUIDELINES

This document provides the lecturer with guidelines to develop and implement a coherent, integrated assessment system for Welding in the National Certificates (Vocational). It must be read with the *National Policy Regarding Further Education and Training Programmes: Approval of the Documents, Policy for the National Certificates (Vocational) Qualifications at Levels 2 to 4 on the National Qualifications Framework (NQF)*. This assessment guideline will be used for National Qualifications Framework Levels 2-4.

This document explains the requirements for the internal and external subject assessment. The lecturer must use this document with the *Subject Guidelines: Welding* to prepare for and deliver Welding (Level 2). Lecturers should use a variety of resources and apply a range of assessment skills in the setting, marking and recording of assessment tasks.

SECTION B: ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

1 ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

Assessment in the National Certificates (Vocational) is underpinned by the objectives of the National Qualifications Framework (NQF). These objectives are to:

- Create an integrated national framework for learning achievements.
- Facilitate access to and progression within education, training and career paths.
- Enhance the quality of education and training.
- Redress unfair discrimination and past imbalances and thereby accelerate employment opportunities.
- Contribute to the holistic development of the student by addressing:
  - social adjustment and responsibility;
  - moral accountability and ethical work orientation;
  - economic participation; and
  - nation-building.

The principles that drive these objectives are:

- ***Integration***

To adopt a unified approach to education and training that will strengthen the human resources development capacity of the nation.

- ***Relevance***

To be dynamic and responsive to national development needs.

- ***Credibility***

To demonstrate national and international value and recognition of qualification and acquired competencies and skills.

- ***Coherence***

To work within a consistent framework of principles and certification.

- ***Flexibility***

To allow for creativity and resourcefulness when achieving Learning Outcomes, to cater for different learning styles and use a range of assessment methods, instruments and techniques.

- ***Participation***

To enable stakeholders to participate in setting standards and co-ordinating the achievement of the qualification.

- ***Access***

To address barriers to learning at each level to facilitate students' progress.

- ***Progression***

To ensure that the qualification framework permits individuals to move through the levels of the national qualification via different, appropriate combinations of the components of the delivery system.

- ***Portability***

To enable students to transfer credits of qualifications from one learning institution and/or employer to another institution or employer.

- ***Articulation***

To allow for vertical and horizontal mobility in the education system when accredited pre-requisites have been successfully completed.

- ***Recognition of Prior Learning***

To grant credits for a unit of learning following an assessment or if a student possesses the capabilities specified in the outcomes statement.

- ***Validity of assessments***

To ensure assessment covers a broad range of knowledge, skills, values and attitudes (SKVAs) needed to demonstrate applied competency. This is achieved through:

  - clearly stating the outcome to be assessed;
  - selecting the appropriate or suitable evidence;
  - matching the evidence with a compatible or appropriate method of assessment; and
  - selecting and constructing an instrument(s) of assessment.

- ***Reliability***

To assure assessment practices are consistent so that the same result or judgment is arrived at if the assessment is replicated in the same context. This demands consistency in the interpretation of evidence; therefore, careful monitoring of assessment is vital.

- ***Fairness and transparency***

To verify that no assessment process or method(s) hinders or unfairly advantages any student, the following could constitute unfairness in assessment:

  - Inequality of opportunities, resources or teaching and learning approaches
  - Bias based on ethnicity, race, gender, age, disability or social class
  - Lack of clarity regarding Learning Outcome being assessed
  - Comparison of students' work with other students, based on learning styles and language

- ***Practicability and cost-effectiveness***

In order to integrate assessment practices within an outcomes-based education and training system and strive for cost and time-effective assessment.

2 ASSESSMENT FRAMEWORK FOR VOCATIONAL QUALIFICATIONS

The assessment structure for the National Certificates (Vocational) qualification is as follows:

2.1 Internal continuous assessment (ICASS)

Knowledge, skills values, and attitudes (SKVAs) are assessed throughout the year using assessment instruments such as projects, tests, assignments, investigations, role-play and case studies. The internal continuous assessment (ICASS) practical component is undertaken in a real workplace, a workshop or a "Structured Environment". This component is moderated internally and externally quality assured by Umalusi. All internal continuous assessment (ICASS) evidence is kept in a Portfolio of Evidence (PoE) and must be readily available for monitoring, moderation and verification purposes.

2.2 External summative assessment (ESASS)

The external summative assessment is either a single or a set of written papers set to the requirements of the Subject Learning Outcomes. The Department of Education administers the theoretical component according to relevant assessment policies.

A compulsory component of external summative assessment (ESASS) is the **integrated summative assessment task (ISAT).** This assessment task draws on the students' cumulative learning throughout the year. The task requires **integrated application of competence** and is executed under strict assessment conditions. The task should take place in a simulated or "Structured Environment". The integrated summative assessment task (ISAT) is the most significant test of students' ability to apply acquired knowledge.

The integrated assessment approach allows students to be assessed in more than one subject with the same integrated summative assessment task (ISAT).

External summative assessments will be conducted annually between October and December, with provision made for supplementary sittings.

3 MODERATION OF ASSESSMENT

3.1 Internal moderation

Assessment must be moderated according to the internal moderation policy of the Further Education and Training (FET) college. Internal college moderation is a continuous process. The moderator's involvement starts with the planning of assessment methods and instruments and follows with continuous collaboration with and support to the assessors. Internal moderation creates common understanding of Assessment Standards and maintains these across vocational programmes.

3.2 External moderation

External moderation is conducted by the Department of Education, Umalusi and, where relevant, an Education and Training Quality Assurance (ETQA) body according to South African Qualifications Authority (SAQA) and Umalusi standards and requirements.

The external moderator:

- monitors and evaluates the standard of all summative assessments;
- maintains standards by exercising appropriate influence and control over assessors;
- ensures proper procedures are followed;
- ensures summative integrated assessments are correctly administered;
- observes a minimum sample of ten (10) to twenty-five (25) percent of summative assessments;
- gives written feedback to the relevant quality assuror; and
- moderates in case of a dispute between an assessor and a student.

Policy on inclusive education requires that assessment procedures be customised for students who experience barriers to learning, and supported to enable these students to achieve their maximum potential.

4 PERIOD OF VALIDITY OF INTERNAL CONTINUOUS ASSESSMENT (ICASS)

The period of validity of the internal continuous assessment mark is determined by the *National Policy on the Conduct, Administration and Management of the Assessment of the National Certificates (Vocational).*

The internal continuous assessment (ICASS) must be re-submitted with each examination enrolment for which it constitutes a component.

5 ASSESSOR REQUIREMENTS

Assessors must be subject specialists and should ideally be declared competent against the standards set by the ETDP SETA. If the lecturer conducting the assessments has not been declared a competent assessor, an assessor who has been declared competent may be appointed to oversee the assessment process to ensure the quality and integrity of assessments.

6 TYPES OF ASSESSMENT

Assessment benefits the student and the lecturer. It informs students about their progress and helps lecturers make informed decisions at different stages of the learning process. Depending on the intended purpose, different types of assessment can be used.

6.1 Baseline assessment

At the beginning of a level or learning experience, baseline assessment establishes the knowledge, skills, values and attitudes (SKVAs) that students bring to the classroom. This knowledge assists lecturers to plan learning programmes and learning activities.

6.2 Diagnostic assessment

This assessment diagnoses the nature and causes of learning barriers experienced by specific students. It is followed by guidance, appropriate support and intervention strategies. This type of assessment is useful to make referrals for students requiring specialist help.

6.3 Formative assessment

This assessment monitors and supports teaching and learning. It determines student strengths and weaknesses and provides feedback on progress. It determines if a student is ready for summative assessment.

6.4 Summative assessment

This type of assessment gives an overall picture of student progress at a given time. It determines whether the student is sufficiently competent to progress to the next level.

7 PLANNING ASSESSMENT

An assessment plan should cover three main processes:

7.1 Collecting evidence

The assessment plan indicates which Subject Outcomes and Assessment Standards will be assessed, what assessment method or activity will be used and when this assessment will be conducted.

7.2 Recording

Recording refers to the assessment instruments or tools with which the assessment will be captured or recorded. Therefore, appropriate assessment instruments must be developed or adapted.

7.3 Reporting

All the evidence is put together in a report to deliver a decision for the subject.

8 METHODS OF ASSESSMENT

Methods of assessment refer to who carries out the assessment and includes lecturer assessment, self-assessment, peer assessment and group assessment.

LECTURER ASSESSMENT	The lecturer assesses students' performance against given criteria in different contexts, such as individual work, group work, etc.
SELF-ASSESSMENT	Students assess their own performance against given criteria in different contexts, such as individual work, group work, etc.
PEER ASSESSMENT	Students assess another student's or group of students' performance against given criteria in different contexts, such as individual work, group work, etc.
GROUP ASSESSMENT	Students assess the individual performance of other students within a group or the overall performance of a group of students against given criteria.

9 INSTRUMENTS AND TOOLS FOR COLLECTING EVIDENCE

All evidence collected for assessment purposes is kept or recorded in the student's Portfolio of Evidence (PoE).

The following table summarises a variety of methods and instruments for collecting evidence. A method and instrument is chosen to give students ample opportunity to demonstrate the Subject Outcome has been attained. This will only be possible if the chosen methods and instruments are appropriate for the target group and the Specific Outcome being assessed.

	METHODS FOR COLLECTING EVIDENCE		
	Observation-based (Less structured)	**Task-based** (Structured)	**Test-based** (More structured)
Assessment instruments	• Observation • Class questions • Lecturer, student, parent discussions	• Assignments or tasks • Projects • Investigations or research • Case studies • Practical exercises • Demonstrations • Role-play • Interviews	• Examinations • Class tests • Practical examinations • Oral tests • Open-book tests
Assessment tools	• Observation sheets • Lecturer's notes • Comments	• Checklists • Rating scales • Rubrics	• Marks (e.g. %) • Rating scales (1-7)
Evidence	• Focus on individual students • Subjective evidence based on lecturer observations and impressions	**Open middle**: Students produce the same evidence but in different ways. **Open end**: Students use same process to achieve different results.	Students answer the same questions in the same way, within the same time.

10 TOOLS FOR ASSESSING STUDENT PERFORMANCE

Rating scales are marking systems where a symbol (such as 1 to 7) or a mark (such as 5/10 or 50%) is defined in detail. The detail is as important as the coded score. Traditional marking, assessment and evaluation mostly used rating scales without details such as what was right or wrong, weak or strong, etc.

Task lists and **checklists** show the student what needs to be done. These consist of short statements describing the expected performance in a particular task. The statements on the checklist can be ticked off when the student has adequately achieved the criterion. Checklists and task lists are useful in peer or group assessment activities.

Rubrics are a hierarchy (graded levels) of criteria with benchmarks that describe the minimum level of acceptable performance or achievement for each criterion. Using rubrics is a different way of assessing and cannot be compared to tests. Each criterion described in the rubric must be assessed separately. Mainly two types of rubrics, namely holistic and analytical, are used.

11 SELECTING AND/OR DESIGNING RECORDING AND REPORTING SYSTEMS

The selection or design of recording and reporting systems depends on the purpose of recording and reporting student achievement. **Why** particular information is recorded and **how** it is recorded determine which instrument will be used.

Computer-based systems, for example spreadsheets, are cost and time effective. The recording system should be user-friendly and information should be easily accessed and retrieved.

12 COMPETENCE DESCRIPTIONS

All assessment should award marks to evaluate specific assessment tasks. However, marks should be awarded against rubrics and not be simply a total of ticks for right answers. Rubrics should explain the competence level descriptors for the skills, knowledge, values and attitudes (SKVAs) that a student must demonstrate to achieve each level of the rating scale.

When lecturers or assessors prepare an assessment task or question, they must ensure that the task or question addresses an aspect of a Subject Outcome. The relevant Assessment Standard must be used to create the rubric to assess the task or question. The descriptions must clearly indicate the minimum level of attainment for each category on the rating scale.

13 STRATEGIES FOR COLLECTING EVIDENCE

A number of different assessment instruments may be used to collect and record evidence. Examples of instruments that can be (adapted and) used in the classroom include:

13.1 Record sheets

The lecturer observes students working in a group. These observations are recorded in a summary table at the end of each project. The lecturer can design a record sheet to observe students' interactive and problem-solving skills, attitudes towards group work and involvement in a group activity.

13.2 Checklists

Checklists should have clear categories to ensure that the objectives are effectively met. The categories should describe how the activities are evaluated and against what criteria they are evaluated. Space for comments is essential.

SECTION C: ASSESSMENT IN WELDING

1 SCHEDULE OF ASSESSMENT

At NQF levels 2, 3 and 4, lecturers will conduct assessments as well as develop a schedule of formal assessments that will be undertaken in the year. All three levels also have an external examination that accounts for 50 percent of the total mark. The marks allocated to assessment tasks completed during the year, kept or recorded in a PoE account for the other 50 percent.

The PoE and the external assessment include practical and written components. The practical assessment in Welding must, where necessary, be subjected to external moderation by Umalusi or an appropriate Education and Training Quality Assurance (ETQA) body, appointed by the Umalusi Council in terms of Section 28(2) of the *General and Further Education and Training Quality Assurance Act, 2001 (Act No. 58 of 2001).*

2 RECORDING AND REPORTING

Welding, as is the case for all the other Vocational subjects, is assessed according to four levels of competence. The level descriptions are explained in the following table.

Scale of Achievement for the Vocational component

RATING CODE	RATING	MARKS %
5	Outstanding	80-100
4	Highly Competent	70-79
3	Competent	50-69
2	Not yet competent	40-49
1	Not achieved	0-39

The programme of assessment should be recorded in the Lecturer's Portfolio of Assessment for each subject. The following at least should be included in the Lecturer's Assessment Portfolio:

- A contents page
- The formal schedule of assessment
- The requirements for each assessment task
- The tools used for each assessment task
- Recording instrument(s) for each assessment task
- A mark sheet and report for each assessment task

The college must standardise these documents.

The student's PoE must include at least:

- A contents page
- The assessment tasks according to the assessment schedule
- The assessment tools or instruments for the task
- A record of the marks (and comments) achieved for each task

Where a task cannot be contained as evidence in the PoE, its exact location must be recorded and it must be readily available for moderation purposes.

The following units guide internal assessment in Welding Level 2:

NUMBER OF UNITS	ASSESSMENT	COVERAGE
2	Formal written tests	One or more completed topics
1	Internal written exam	All completed topics
3	Practical assessments	Must cover the related Subject Outcomes EXAMPLES: • A research project on subject-related current issues from different sources, e.g. the Internet, magazines and newspapers • Welding of components in the engineering fabrication industry

ASSESSMENT OF WELDING

LEVEL 2

3 INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN WELDING – LEVEL 2

Topic 1: Arc welding principles (fillet welding

SUBJECT OUTCOME	
1.1 Describe the use of electricity for arc welding.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Basics of electricity are explained • Nature of the electric arc is discussed • The arc as a heat source is explained • Arc power is discussed • Basic terminology for welds (for example run layer, top, root, penetration) is applied • Welding processes (manual metal arc – MMA; metal inert gas – MIG; etc.) are explained • Welding consumables are identified and their application explained • Metal transfer is explained. • The formation of the welding pool is explained	• Describe the principles of arc welding • Explain the basic terms in welding • Briefly explain heat generation in the arc • Briefly explain material transfer through the arc. • Briefly explain the formation of the weld pool
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / Discussion / Portfolio assignment	

SUBJECT OUTCOME	
1.2 Know the operating principles of welding equipment for arc welding.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Distribution of electricity and the mains supply is discussed. • The concept of converting mains to electric power and its relationship with the welding source is explained. • Transformers and the use of AC are explained. • The operating principles of rectifiers for DC are explained. • Open circuit, arc voltage and welding current is explained • Type of welding current and polarity is identified and discussed • Duty cycle is described. • Shielding gas supply is explained • Welding parameters are discussed and explained	• Describe the major components of welding equipment and their function. • Describe polarity and change of polarity • Name the important parameters of arc welding
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / Discussion / Portfolio assignment	

SUBJECT OUTCOME	
1.3 Explain the hazards and basic safety requirements when welding.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The danger of electric shock when welding is described. • UV- and heat radiation are explained • Eye hazards are explained. burns, fires, fire-fighting • Causes of burns and fires are explained. • Fire prevention and fire-fighting methods are discussed and explained • The implications of welding fumes and the prevention thereof are explained. • Respiratory hazards are identified and preventative	• Identify dangerous situations related to electricity (humidity, DC and AC). • Describe health risks associated with welding fumes. • Identify signals for escape routes. • Identify and use personal protective equipment. • Identify measures to prevent a fire. • Identify measures to prevent noise from being a hazard. • Explain rules and regulations

methods are discussed. • Personal protective equipment is listed and its purpose explained • Noise hazards are explained and preventative action taken. • Specific rules and regulations are listed and explained	
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / Discussion / Portfolio assignment	

SUBJECT OUTCOME	
1.4 Describe how to perform welding activities safely in the fabrication shop.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Hazards in the working environment of the fabrication shop are identified *Range: general hazards, dust, heavy and hot materials; electric cables.* • Preventative measures offering protection from welding hazards for other workers are described. • Control of the welder's local environment and fume disposal are explained. • Safety measures in the case of personal accident, monitoring operations and escape procedures are discussed. • The dangers of working in confined spaces; the build-up of pollutants, the enrichment of gases like argon and helium and the risk of explosion, are explained. • The safe handling of gas cylinders is explained.	• Explain and discuss general hazards in the fabrication shop. • Explain the need for ventilation. • Explain the risk of explosions • Describe and explain the safe handling of gas cylinders.
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / Discussion / Portfolio assignment	

SUBJECT OUTCOME	
1.5 Explain the basic principles of the use of welding consumables.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Welding consumables are identified and their functions are explained. *Range: electrodes, rods and gases (shielding gases, backing gases) and includes the classification of various welding consumables* • Storage, drying and handling procedures of welding consumables are explained. • The designation of welding consumables as used on a WPS is identified.	• Identify and explain the types and functions of welding consumables and their applications. • Explain the reasons for and explain how to dry, store and handle welding consumables. • Identify the designation of welding consumables as used on a Welding Procedure Specification (WPS) of a training program.
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / Discussion / Portfolio assignment	

SUBJECT OUTCOME	
1.6 Describe how to work to a welding procedure specification (WPS) using welding parameters.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Welding details on a drawing and welding symbols are interpreted • Welding positions are identified. • Types of welding joints: T-lap, corner, etc., are identified and explained. • The fillet weld: size, shape, tack weld, and excess metal	• Explain and discuss the function and purpose of a welding procedure specification. • Explain the various welding parameters and welding positions. • Demonstrate an understanding of welding symbols (ISO 2553)

are identified and discussed. • The use of a WPS in production is discussed and explained. • Methods for achieving the required welding parameters are described.	
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / Discussion / Portfolio assignment	

SUBJECT OUTCOME	
1.7 Describe the effect of welding parameters on performance and their influence on welding surface.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The influence of the welding parameters on the weld surface is described. • The effect of incorrect welding parameters is explained. • The different types of imperfections are identified according to ISO 6520-1. • The performance of visual inspections on a fillet weld and the correct method of evaluation are explained according to ISO 5817. • Magnetic arc blow is described and preventative measures are explained.	• Explain and discuss weld imperfections. • Discuss the control of welding parameters • Explain the effect of magnetic arc blow.
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / Discussion / Portfolio assignment	

SUBJECT OUTCOME	
1.8 Explain and apply methods of joint preparation for welding.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Suitable cutting processes for different types of steel to achieve a suitable cutting surface are described. • Flame cutting: principles and parameters, cutting blow pipes, cutting machines, quality of cut surfaces (ISO 9013 and other) • Arc gouging and gas gouging principles are described and their processes explained. • Other cutting processes as: plasma; laser; mechanical cutting are explained and discussed.	• Discuss the methods used for joint preparation and their specific application • Understand the parameters and results associated with thermal cutting (plasma and flame cutting) • Identify suitable cutting and gouging processes for the main types of steel.
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / Discussion / Portfolio assignment	

SUBJECT OUTCOME	
1.9 Explain the basics of a welder qualification according to ISO 9606.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The objectives of qualification tests are explained and discussed • The qualification of a welding procedure specification (WPS) is explained and discussed. • The welder's qualification standard is explained (ISO 9606) • The essential variables, range of qualification, validity, test pieces and assessment of the welder are explained.	• Describe the range of a qualification in a welder's certificate. • Outline the essential variables for a welder qualification test.
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / Discussion / Portfolio assignment	

Topic 2: Shielded metal arc welding (downhand position)

SUBJECT OUTCOMES	
2.1 Describe the shielded metal arc welding (SMAW) process	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Basic and major components of SMAW equipment and their functions are identified and explained. • The importance of the correct setting of the power source and choice of electrode and the consequences of incorrect selection is explained • The thickness of materials, in relation to size and type of welding electrode used, and the influence of electrode manipulation during the welding process are explained. *Range: Welding consumables include misuse; mishandling; baking procedures.* • Welding characteristics of low carbon steel are identified and the implications for unsafe conditions are described. • Terms and definitions used are consistent with generally accepted welding terminology as recorded in welding standards.	• Comprehensively explain the terminologies associated with shielded metal arc welding procedures. • Explain the actual chemical and mechanical processes that take place during welding. • Explain the down-hand -SMAW method. • Identify the various welding parameters, in relation to the thickness of materials (steel) being welded. • Demonstrate setting up procedures
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / Discussion / Portfolio assignment. However, this topic must be integrated with a practical assignment or task which may be demonstrated as a product of the student's abilities. *Range: Parts include: Suitable power source, earth clamp, electrode holder and welding cable.* • Students must request all the necessary equipment they require to set up the welding equipment correctly. If anything is left out the student should be penalised and the lecturer should note accordingly.	

SUBJECT OUTCOMES	
2.2 Plan and prepare for the welding process.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Welding hazards are identified and eliminated in accordance with standard working practices. • The selection of shielded metal arc welding equipment as specified in the welding procedure is verified. • Work-piece/s prepared prior to welding as specified on drawing and working practices. • Task dimensions and work-piece alignment are checked as specified on drawing	• Explain the safety aspects of SMAW in the fabrication workshop. • Prepare the SMAW equipment • Prepare the welding environment.
ASSESSMENT TASKS OR ACTIVITIES	
• Assessment by observation checklist and/or theoretical assessment. • Using knowledge and skills acquired, the equipment is set up correctly and checked by the lecturer before any welding operations begin • The shielded metal arc equipment to be well insulated to avoid electric shock. • Work-piece tack welded in position as per drawing specifications. • Safety precautions adhered to. • Inspection work-piece prior to welding. • Before any welding can take place all students found competent in this activity may proceed to the welding operation *Range: Parts include: Suitable power source, earth clamp, electrode holder and welding cable.* *Range: Material type to be used: May be selected from the range of carbon steels (plate only), applicable to the material groups 1, 2, 3 or 11 [according to ISO (TR) 15608].* *Range: Material thickness: minimum –1,6mm* • Despite the minimum material thickness as specified, students must display sufficient competency to prepare the groove prior to welding.	

SUBJECT OUTCOMES
2.3 Weld materials.

ASSESSMENT STANDARD	LEARNING OUTCOME
• The welding of the work-piece material is carried out in accordance with work instruction sheet and drawing requirements. • Safety precautions are applied and adhered to in accordance with OHS Act (applicable to the SMAW process.). • Quality checks on welded materials are applied. • The end product is inspected to conform to specifications as reflected on drawing or job requirement. *Range: Defects include excessive slag, spatter and irregular weld finish (bead).* *Range: Hazards include fire, electrocution; incorrect set-up procedures and unsafe use of power tools are explained.* • Welding defects are identified and corrective action is taken.	• Explain and adhere to all safety precautions according to workshop requirements and OHS Act • Demonstrate the SMAW process by welding the work-piece using knowledge and skills attained. • Inspect welded work-piece for defects and apply quality checks on process.
ASSESSMENT TASKS OR ACTIVITIES	
• Assessment by practical project/task. • Lecturer to ensure correct posture, weld-direction, angle of electrode to work-piece, pressures • Students to use skills, knowledge and safety during welding. • Lecturers are to ensure all personal protective equipment (PPE) is correctly and appropriately worn. • All welding must take place in a controlled environment and lecturers to ensure quality of cuts. *Range: :* • *Material type to be used: May be selected from the range of carbon steels (plate only), applicable to the material groups 1, 2, 3 or 11 [according to ISO (TR) 15608).* • *Material thickness: minimum –1,6mm* • *Resources include:* • *Welding equipment, tools, protective clothing and equipment, welding procedure specification, materials as specified on drawings and weld filler material.* • *Weld positions to include:* • *Fillet welding and groove welding:* • *Flat/Horizontal* • *Welded joints acceptance criteria to be in accordance with a national and/or international welding standard.*	

SUBJECT OUTCOMES	
2.4 Care and store welding equipment.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The proper care and storage of tools and equipment is explained in accordance with worksite practices. • Shielded metal arc welding equipment is dismantled according to workshop procedures • The welding equipment, hand tools and consumables, are dismantled and packed away neatly and safely in accordance with laid down procedures	• Explain the care and storage procedures for tools, equipment in accordance with work site practices and specifications. • Dismantle and store the welding equipment in accordance with manufacturer's specifications and requirements.
ASSESSMENT TASKS OR ACTIVITIES	
• Assessment by observation checklist and/or theoretical assessment. • Using knowledge and skills acquired, the equipment is dismantled correctly and checked by the lecturer who makes a competency judgement after welding operations have been completed. • Tools and equipment are stored to conform to worksite practices	

Topic 3: Oxy-acetylene cutting (gas cutting)

SUBJECT OUTCOME	
3.1 Describe the oxy-acetylene cutting process	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The importance of correct setting of cutting pressures,	• Explain the terminologies associated with oxygen-

and the consequences of incorrect settings, is explained *Range: The thickness of materials, size and type of cutting nozzles in relation to fuel gas used, and the impact of cutting torch manipulation during the cutting process.* • Basic and major components of the oxy-acetylene cutting process and equipment are identified, and the explanation, function and purpose are correctly explained in terms of cutting standards. • The consequences of incorrect start up and shut down procedures are explained. • Cutting characteristics of low carbon steel are identified and the implications for un-safe conditions are described. • Cutting characteristics of low carbon steel are identified and explained in relation to the cutting process. • Terms and definitions used are consistent with general accepted cutting terminology as records in resource materials.	acetylene gas cutting procedures • Identify the various cutting pressures and the correct nozzles associated with each in relation to the thickness of materials (steel) being cut • Explain the actual chemical and mechanical processes that take place during cutting • Explain and implement the procedures for carrying out various pre-operational checks • Demonstrate start up and shut down procedures
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / discussion / portfolio assignment. However, this topic must be integrated with a practical assignment or task which may be demonstrated as a product of the student's abilities. • Students must request all the necessary equipment they require to set up the cutting equipment correctly • If anything is left out they should be penalised and the lecturer should note this down • Using knowledge and skills acquired, the equipment is set up correctly and checked by the lecturer before any cutting operations begin	

SUBJECT OUTCOME	
3.2 Cut materials.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Safety precautions are applied and adhered to in accordance with OHS Act (applicable to the cutting process). • Safety hazards including flashbacks are avoided. • Cutting of material is carried out in accordance with work instruction sheet and drawing requirements. • The end product is inspected to conform to specifications as reflected on drawing or job requirement. • Quality checks on the cut materials are applied. • Cutting defects are identified and corrective action is taken. *Range: Defects include excessive slag, rough cutting surface, jagged edges, rounded top corner*	• Explain and implement all safety precautions according to workshop requirements and OHS Act • Demonstrate the cutting operation using knowledge and skills attained • Explain and apply quality checks on process
ASSESSMENT TASKS OR ACTIVITIES	
• Practical project/task. • Assessment by observation checklist, mark-sheet and/or theoretical assessment. • Lecturer to ensure correct posture. • Students to use skills, knowledge and safety during cutting • Lecturers are to ensure all personal protective equipment (PPE) is correctly and appropriately worn. • All cutting must take place in a controlled environment and lecturers to ensure quality of cuts *Range:* • *Material type to be used: May be selected from the range of carbon steels (plate only), applicable to the material groups 1, 2, 3 or 11 [according to ISO (TR) 15608).* • *Material thickness: minimum – 10mm* • *Visual identification of cutting defects includes but is not limited to incorrect cutting torch manipulation, angle, burned edges, flame and pressure setting* • *Cleaning of cuts includes removal of scale, spatter, soot and removal of sharp edges*	

SUBJECT OUTCOME	
3.3 Care and storage of tools and cutting equipment	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The proper care and storage procedures for tools and equipment is explained and demonstrated according to worksite practices. • The oxy-acetylene cutting equipment is dismantled and stored according to workshop procedures. • Cylinders, hoses, gauges and torches are packed away neatly and safely in accordance with workshop procedures.	• Explain the care and storage procedures for tools and equipment in accordance with worksite practices and specifications. • Describe and implement the dismantling and storage of oxy-fuel cutting equipment in accordance with manufacturer's specifications and requirements.
ASSESSMENT TASKS OR ACTIVITIES	
• Assessment by observation checklist and/or theoretical assessment. • Cleaning tools include but are not limited to wire brushes, chipping hammer, and chisels. • Tools and equipment are stored to conform to worksite practices	

Topic 4: Oxy-acetylene welding (gas welding: down-hand position)

SUBJECT OUTCOME	
4.1 Describe the oxy-acetylene welding process (down-hand position)	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Terminologies associated with oxygen-acetylene gas welding procedures are explained. • Gas welding and related equipment are identified and described • The actual chemical and mechanical processes that take place during welding are explained. • The down-hand gas-welding method is explained. • The various welding pressures and the correct nozzles associated with each are identified, in relation to the thickness of materials (steel) being welded. • Start up and shut down procedures are demonstrated. • welding consumables are identified, selected and classified. • Safety precautions associated with gas welding are explained and discussed.	• Explain the terminologies associated with oxygen-acetylene gas welding procedures. • Identify and describe gas welding and related equipment • Explain the actual chemical and mechanical processes that take place during welding. • Explain the down-hand gas-welding method. • Identify the various welding pressures and the correct nozzles associated with each, in relation to the thickness of materials (steel) being welded. • Demonstrate start up and shut down procedures. • Identify, select and classify welding consumables • Explain and discuss the safety precautions associated with gas welding.
ASSESSMENT TASKS OR ACTIVITIES	
• Questionnaire / discussion / portfolio assignment. However, this topic must be integrated with a practical assignment or task which may be demonstrated as a product of the students abilities. • Students must request all the necessary equipment they require to set up the welding equipment correctly. If anything is left out they should be penalised and the lecturer should note this down • Using knowledge and skills acquired, the equipment is set up correctly and checked by the lecturer before any welding operations begin	

SUBJECT OUTCOME	
4.2 Plan and prepare for the gas welding process.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Hazards relating to the welding process are identified and eliminated in accordance with standard working practices. • The selection of oxy-acetylene gas welding equipment is verified as specified in the welding procedure. • Work-piece/s are prepared prior to welding as specified on drawing and in working practices. • The task dimensions and work-piece alignment are checked as specified on drawing	• Explain the safety aspects of gas welding in the fabrication workshop. • Prepare the welding equipment • Prepare the welding environment

ASSESSMENT TASKS OR ACTIVITIES
• Assessment by observation checklist and/or theoretical assessment. • The oxy-acetylene equipment to be leak free. • Work-piece tack welded in position as per drawing specifications. • Safety precautions adhered to. • Inspect work-piece prior to welding. • Students must be found competent in this activity before proceeding to the welding operation *Range:* • *Parts include: Welding hoses, jubilee clamps, gas cylinders (oxygen and fuel gas), regulators, welding torch, welding nozzles, non-return valves and flashback arrestors* • *Material type to be used: May be selected from the range of carbon steels (plate only), applicable to the material groups 1, 2, 3 or 11 [according to ISO (TR) 15608).*

SUBJECT OUTCOME	
4.3 Weld materials	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Safety precautions are explained and implemented according to workshop requirements and OHS Act • The gas welding process is demonstrated • Welded work-piece is inspected for defects and quality checks applied to the process. *Range:* • *Material type to be used: May be selected from the range of carbon steels (plate only), applicable to the material groups 1, 2, 3 or 11 [according to ISO (TR) 15608).* • *Material thickness: minimum –1,6mm* • *Resources include:* • *Welding equipment, tools, protective clothing and equipment, welding procedure specification, materials as specified on drawings and weld filler material.* • *Weld positions to include:* • *Fillet welding and groove welding:* • *Flat/Horizontal* • *Welded joints acceptance criteria to be in accordance with a national and/or international welding standard.*	• Explain and adhere to all safety precautions according to workshop requirements and OHS Act • Demonstrate the gas welding process, using knowledge and skills attained • Inspect welded work-piece for defects and apply quality checks to the process.
ASSESSMENT TASKS OR ACTIVITIES	
• Practical project/task. Assessment by observation checklist and/or theoretical assessment. • Lecturer to ensure correct posture, weld-direction, angle of electrode to work-piece, gas pressures • Students to use skills, knowledge and safety during cutting • Lecturers to ensure that all PPE is correctly and appropriately worn. • All welding must take place in a controlled environment and lecturers to ensure quality of cuts	

SUBJECT OUTCOME	
4.4 Care and storage of welding equipment	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The proper care and storage procedures for tools and equipment is explained and demonstrated according to worksite practices. • The oxy-acetylene welding equipment is dismantled according to workshop procedures. • Cylinders, hoses, gauges and torch are packed away neatly and safely in accordance with workshop procedures.	• Explain and demonstrate the care and storage procedures for tools and equipment in accordance with work site practices and specifications. • Describe and implement dismantling and storage of gas welding equipment in accordance with manufacturer's specifications and requirements.
ASSESSMENT TASKS OR ACTIVITIES	
• Assessment by observation checklist and/or theoretical assessment.	

- Tools and equipment are stored to conform to worksite practices

4. SPECIFICATIONS FOR EXTERNAL ASSESSMENT IN WELDING – LEVEL 2

4.1 Integrated summative assessment task (ISAT)

A compulsory component of the external assessment (ESASS) is the **integrated summative assessment task (ISAT)**. The integrated summative assessment task (ISAT) draws on the students' cumulative learning achieved throughout the year. The task requires **integrated application of competence** and is executed and recorded in compliance with assessment conditions.

The ISAT may be applied as follows:

- The students are assigned a task at the beginning of the year which they will have to complete in phases throughout the year to obtain an assessment mark. A final assessment is made at the end of the year when the task is completed;

OR

- The students achieve the competencies throughout the year but the competencies are assessed cumulatively in a single assessment or examination session at the end of the year.

The integrated summative assessment task (ISAT) is set by an externally appointed examiner and is conveyed to colleges in the first quarter of the year.

The integrated assessment approach enables students to be assessed in more than one subject with the same integrated summative assessment task (ISAT).

4.2 National examination

A national examination is conducted annually in October or November by means of a paper(s) set and moderated externally. The following distribution of cognitive application is suggested:

LEVEL 2	KNOWLEDGE AND COMPREHENSION	APPLICATION	ANALYSIS, SYNTHESIS AND EVALUATION
	30%	50%	20%