| QUALIFICATION SPECIFICATION SECTION A | | | | | | | |
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| **QUALIFICATION DEVELOPER** | **MINISTRY OF EMPLOYMENT, LABOUR PRODUCTIVITY AND SKILLS DEVELOPMENT** | | | | | | |
| **TITLE** | Certificate III in Fabrication and Welding | | | | **NCQF LEVEL** | **3** | |
| **FIELD** | Manufacturing, Engineering and Technology | | **SUBFIELD:** | | Fabrication and Welding | | |
| New qualification | √ | | Review of existing qualification | | | | |
| **SUB-FRAMEWORK** | General Education | | TVET | √ | Higher Education | | |
| **QUALIFICATION TYPE** | Certificate | √ | Diploma | | Bachelor | | |
| | Bachelor Honours | | Master | | Doctorate/ PhD | | |
| **CREDIT VALUE** | | | | | **40 Credits** | | |

**RATIONALE AND PURPOSE OF THE QUALIFICATION**

## RATIONALE

The Botswana Vision 2036 states that development of the human capital and the informal sector and the micro and small enterprises (MSES) are essential in achieving the VISION 2036 pillars, in particular Sustainable Economic Development and Human and Social Development. Although Botswana has been fortunate to experience unprecedented economic growth since independence, this has not generated enough jobs to reduce unemployment. The most severely hit group amongst the unemployed is the youth, who account for about 51.7 % of the total unemployed, with the 15-19 age group most affected (Statistics Botswana 2018).

The Botswana Education and Training Sector Strategic Plan (ETSSP 2015-2020) marks a significant milestone in our collective efforts as a nation to bring about a more diversified, knowledge-based economy. Through a planned and careful development of human capital, the ETSSP seeks to refocus our education and training towards fulfillment of social and economic aspirations identified in our Revised National Policy on Education (RNPE) of (1994), the National Development Plan 11, Vision 2036 and as well as the Millennium Development Goals (MDG). In particular, the ETSSP is intended to strengthen the link between qualifications and labour market requirements, thereby ensuring that education and training outputs are more closely aligned to socio economic development needs of the country. In line with this strategic goal, the Human Resource Development Council (HRDC 2016) report on top occupations in demand has identified Welding and Fabrication as one of the priority skills for the Manufacturing and Engineering Sector.

From the abstract retrieved from: Welding Technology in the Construction Industry in Botswana by C Chterev and J D G Foster, it states that a survey of companies connected to welding in support of the construction industry in Botswana was conducted by these authors. The results show that companies in the industry are generally small, and that the welding technology used is predominantly that of manual metal arc welding. The application of metal active gas welding (mag) is very limited in comparison with the level of use that is achieved in the industrialized countries of

the world. The comparison was used to work out the fundamental directions for further development of welding technology and infrastructure in Botswana. Recommendations were made to assist in the application of modern welding technology in Botswana, which would bring benefits to the construction industry in terms of both cost and quality. A way should be found to ensure that craft trainees and practicing welders in all industries gain experience of advanced methods of production that employ modern welding technologies. Efforts should also be made to encourage partnerships between the private sector and government in education and training, especially with regard to curriculum development. This would ensure that education meets the needs of the construction and engineering sector, hence the decision by the department of Skills Development through industry and stakeholder consultation to develop the new curriculum.

**PURPOSE**

The purpose of this qualification is to produce semi-skilled workers with competence to perform a range of functions including;

- Use of tools and equipment
- Perform basic material removal processes
- Perform basic fastening and joining techniques
- Interpret and produce engineering drawings for specific purposes
- Apply knowledge of metallic and non-metallic materials and in the selection of materials in accordance with established codes of practice and relevant legislation.

Candidates holding this qualification should be able to perform routine work under supervision and take some responsibility for own learning and completion of work.

## ENTRY REQUIREMENTS (including access and inclusion)

Entry to this qualification is through any of the following:

- NCQF Level 2 or any equivalent qualification
- Any relevant part qualification at NCQF Levels 3 may render the candidate eligible for exemptions or credit transfer in accordance with applicable policies.
- Candidates with relevant prior learning may be considered for admission and or exemption in line with Recognition of Prior Learning (RPL) and CATS policies.

| QUALIFICATION SECTION B | SPECIFICATION |
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| **GRADUATE PROFILE (LEARNING OUTCOMES)** | **ASSESSMENT CRITERIA** |
| Communicate with clients, colleagues and others using appropriate forms of communication techniques. | • Use written, verbal, non-verbal communication appropriate to the target audience.<br>• Interpret stipulated instructions or requirements.<br>• Apply information acquired in the performance of tasks or discussions with other people.<br>• Apply relevant definitions, terminology, abbreviations and language.<br>• Present information using appropriate language and formats.<br>• Construct clear sentences to produce a written logical and coherent piece of writing.<br>• Use appropriate presentation formats and styles of writing to produce error free business documents. |
| Use ICT for information retrieval and processing as well as communication and collaboration with others | • Use ICT responsibly and ethically.<br>• Manage information using ICT.<br>• Organize and synthesize information using ICT.<br>• Implement data loss prevention strategies using ICT.<br>• Present information in a variety of formats using ICT. |
| Select and use appropriate tools and equipment for an engineering application in accordance with job specification. | • Examine job specification to determine the tools and equipment to be used in relation to occupation safety code.<br>• Select appropriate tools and equipment to be used in line with the job requirements.<br>• Carry out tasks as per job specification, adhering to health, safety and quality standard<br>• Service and maintain tools and equipment in accordance with Original Manufacturers Specification (OMS) where applicable.<br>• Perform quality checks on work done and make improvements where needed.<br>• Clean tools and equipment and store them in an appropriate place after use.<br>• Clean/tidy up the work area in accordance with organizational requirements. |
| Perform basic metal removal processes in engineering | • Examine the nature of work to be done inclusive of |

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| workshops. | material to be worked on to determine tools and measuring instruments to be used.<br>• Select and use tools and equipment in line with job specification.<br>• Carry out tasks as per job specification, adhering to health, safety and quality standard<br>• Perform quality checks on the job done and make improvements as needed.<br>• Clean tools and equipment and store them in an appropriate place after use.<br>• Clean/tidy up the work area in accordance with organizational requirements. |
| Perform basic fastening and joining techniques in a specified job | • Examine the nature of work to be done inclusive of material to be worked on to determine fasteners, tools, equipment to be used and joining techniques to be applied.<br>• Select and use appropriate fasteners and joining techniques for specific purposes.<br>• Carry out tasks as per job specification, adhering to health, safety and quality standard.<br>• Perform quality checks on the job done and make improvements as needed.<br>• Clean tools and equipment and store them in an appropriate place after use.<br>• Clean/tidy up the work area in accordance with organizational requirements. |
| Maintain basic electrical circuits | • Examine the job specification to determine materials, tools and equipment to be used.<br>• Select appropriate materials, tools and equipment to be used to design and build the circuit according the job specification<br>• Construct electrical circuits on panel board according to established codes of practice and job specification<br>• Use an appropriate electrical tester and measuring instruments to test electrical circuits on panel board according to job specification<br>• Perform fault finding and rectify faults accordingly in electrical circuits.<br>• Clean tools and equipment and store them in an appropriate place after use.<br>• Clean and tidy up the work area in accordance with organizational requirements |
| Implement a maintenance | • Examine the nature of maintenance work to be carried |

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| schedule in accordnance with orgnaisational requirements. | out to determine the materials, tools and equipment to be used.<br>• Obtain the required materials, tools and equipment in line with the job requirements.<br>• Prepare for and carry out maintenance work in accordance with stipulated specifications.<br>• Perform quality checks on work done and make improvements where needed.<br>• Perform necessary tests to confirm functionality.<br>• Clean tools and equipment and store them in appropriate places after use.<br>• Keep records and report to immediate supervisor as needed. |
| Interpret and Produce engineering drawings for specific purposes. | • Examine the nature of work to be carried out to determine the drawing tools and equipment to be used.<br>• Select engineering drawing equipment in line with the job specification.<br>• Produce drawings and orthographic representations for specified projects in accordance with established codes of engineering drawing practice and associated conventions.<br>• Perform quality checks on work done and make improvements where needed.<br>• Clean tools and equipment and store them in appropriate places after use. |
| Apply knowledge of engineering materials in the selection of materials for specific projects. | • Examine the nature of work to be carried out<br>• Carry out simple tests to distinguish between metallic and non-metallic materials where applicable.<br>• Apply knowledge of characteristics/properties of metallic and non-metallic materials to select materials for specific projects.<br>• Carry out tasks as per job specification, adhering to health, safety and quality standard<br>• Perform quality checks on the job done and make improvements as needed.<br>• Clean tools and equipment and store them in an appropriate place after use.<br>• Clean/tidy up the work area in accordance with organizational requirements. |

| **QUALIFICATION STRUCTURE SECTION C** | | | |
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| **FUNDAMENTAL COMPONENT** Subjects / Units / Modules /Courses | **Title** | **Level** | **Credits** |
| | Communication Skills | 3 | 3 |
| | Information and Communication Technology (ICT ) | 3 | 3 |
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| **CORE COMPONENT** Subjects / Units / Modules /Courses | | | |
| | Basic engineering drawing | 3 | 6 |
| | Basic metal work | 3 | 14 |
| | Engineering materials | 3 | 4 |
| | Joining processes and equipment | 3 | 10 |
| | | | |
| **ELECTIVE COMPONENT** Subjects / Units / Modules /Courses | NOT APPLICABLE | | |
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**Rules of combinations, Credit distribution** (where applicable):

A candidate to achieve a maximum of **40** credits inclusive of **6** credits for fundamental and **34** credits core. A candidate to be awarded this qualification is required to achieve the stipulated total credits inclusive of the fundamental and core components

## ASSESSMENT AND MODERATION ARRANGEMENTS

### ASSESSMENTS

All assessments, formative and summative, leading/contributing to the award of credits or a qualification should be based on learning outcomes and/or sub-outcomes.

**Formative assessment**

Formative assessment or continuous assessment contributing towards the award of credits should be based on course outcomes. This may include tests, assignments and projects as well as simulated and or real work settings. The contribution of formative assessment to the final grade shall be 60%.

**Summative assessment**

Candidates shall undergo assessment including written and practical and simulated projects. The final examination for each course contributes 40% of the final mark for that course. To pass a course, a candidate must achieve a minimum of 60%.

All summative practical assessments must, as far as possible, be conducted in real work settings.

**MODERATION**
The following shall apply for both internal and external moderation.

**Internal Moderation**
The internal moderation process shall be conducted by assessors at institution level who are accredited with BQA in their areas of specialty as assessors and moderators

**External Moderation**
External moderation shall be performed an examination unit or awarding body. The examination unit / awarding body shall perform the quality assurance mandate and being responsible for identifying industry players, partnerships and experts to assist in in the process.

**Documentation**
All necessary documents including: qualification documents, alignment matrices, assessment instruments and Assessment criteria/rubrics should be available.

**Pre-assessment Moderation**
Before administering any assessments that contribute towards the award of credits, moderation must take place.

**Post-assessment Moderation**
Moderators must verify that the assessment has been done in compliance with assessment principles.

## RECOGNITION OF PRIOR LEARNING (RPL) if applicable

Candidates may submit evidence of prior learning and current competence and/or undergo appropriate forms of RPL assessment for the award of credits towards the qualification in accordance with applicable RPL policy.

## PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

**Learning Pathways:**

**Horizontal Articulation**
*Graduates of this qualification can pursue the following: -*

- Certificate III in Machine Fitting
- Certificate III in Auto Mechanics
- Certificate III in Maintenance Fitting

**Vertical Articulation**
*Graduates of this qualification can progress in the following:*

- Certificate IV in Fabrication and Welding or equivalent

**Employment Pathways**

*People graduated in this qualification may work as:*

- Workshop assistant
- Store person
- Set up own informal business.

## QUALIFICATION AWARD AND CERTIFICATION

**Minimum standards of achievement for the award of the qualification**

A candidate is required to achieve the stipulated minimum 40 credits inclusive of 6 credits for fundamental and 34 credits of core components to be awarded the qualification.

**Certification**

Candidates meeting prescribed requirements will be awarded a certificate in accordance with standards prescribed for the award of the qualification and applicable policies.

## REGIONAL AND INTERNATIONAL COMPARABILITY

| **Comparability Matrix of Qualifications** | **Subfield: Fabrication and Welding** |
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**Introductory Statement**

Benchmarking has been done against a sample of similar types and levels qualifications and or programs offered within the region and beyond to appreciate international trends and practices in relation to exit level descriptors and scope of content covered and ascertain regional and international comparability and articulation of the proposed qualification. The outcome of this process are highlighted below:

**Summary of Similarities and Differences Observed**

**SAQA Welding and Fabrication( NQF level 3**)worth 151 credits The qualification is intended to develop knowledge skills and competences in:

- Welding technology, techniques, processes and skills, as applied in the fabrication and welding industry
- Using appropriate tools and measuring equipment.
- Oxy-fuel cutting and oxy-fuel joining processes
- Reading and interpreting work instructions, documents and drawings
- Communicate effectively in order to achieve personal, business and organizational objectives.

Assessment strategies for the qualification include questioning, observation, reports and portfolio.

Rules for the award: Candidates are required to achieve a minimum of 151 of credits inclusive of: fundamental 37 credits, Core 92 credits, and Elective 22 credits.

Holders of this qualification may pursue other qualifications in corporate areas for multi skilling

purposes. For upgrading graduates may pursue qualifications at diploma level. Employment pathways for graduates include but not limited to boiler making, plating and auto body building.

**NZQA** in Mechanical Engineering **( NZQF level 3)** worth 120 credits **.**The qualification is intended to develop knowledge skills and competences in:

- Health and safety
- Mechanical Engineering Drawing and Calculations
- Mechanical Engineering Workshop
- Mechanical Engineering Materials and Machining Fabrication Processes
- Welding for Mechanical Engineering
- Mechanical Engineering Processes and Quality
- Mechanical Engineering Communication

Assessment strategies for the qualification include oral and written questioning, observation, reports and portfolio.

Rules for the award: Candidates are required to achieve a minimum of 120 credits for Core only. Holders of these qualifications may pursue other qualifications in corporate areas for multi skilling purposes. For upgrading graduates may pursue qualifications at diploma level. Employment pathways for graduates include : CNC Machine Operator, Mould and Core Maker, Furnace Operator, Machine Operator, Specialist Production Welder, Metal Worker/Fabricator, Ducting Fabricator, Pipe Fitter/Welder, Metal Polisher and Pattern Maker Trade Assistant

A direct comparison with these international qualifications indicates that the education and training focus of all the qualifications is basically the same. However, it was noted that the method of assessment is more or less the same: Generally assessments are normally through on-the-job observation and questioning which actually confirms learners can demonstrate competence in the workplace. Candidates are assessed to underpin knowledge, understanding and work-based performance.

**Comparability and articulation of the proposed qualification with the ones examined**

The qualification designed for Botswana compares very well with the foreign qualifications studied in that: it covers / emphasizes all similar competencies and attributes and that it follows a structure typical of similar types and levels of qualifications.

**REVIEW PERIOD**

This program shall be reviewed every five (5) years