BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS				
QUALIFICATION DEVELOPER (S)	Madirelo Training and Testing Centre				
TITLE	Certificate IV in Instrumentation and Control			**NCQF LEVEL**	5
STRANDS (where applicable)	*N/A*				
FIELD	Manufacturing, Engineering and Technology	**SUB-FIELD**	Engineering and Engineering Trades	**CREDIT VALUE**	60

New Qualification														*Legacy Qualification*			
SUB-FRAMEWORK	*General Education*				*TVET*				✓	*Higher Education*							
QUALIFICATION TYPE	*Certificate*	*I*		*II*		*III*		*IV*	✓	*V*		*Diploma*		*Bachelor*			
	Bachelor Honours			*Post Graduate Certificate*				*Post Graduate Diploma*									
	Masters					*Doctorate/ PhD*											

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. The vision 2036 calls for a sustainable and economy that depends on Science, Technology, Engineering and Mathematics as drivers of innovation. Electronics ranging from development of electronic gadgets, measurement, automation, instrumentation, control and solar energy are targeted as areas of innovation. Technical Vocational Educationand Training wishes to produce innovative artisans in areas of Instrumentation and Control.

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 the education and training towards fulfillment of social and economic aspirations identified in the Revised National Policy onEducation (RNPE)1994, the National Development Plan, Vision 2036 and as well as the Millennium Development Goals. In particular, the ETSSP is intended to strengthen the match between qualifications and labor market requirements, thereby ensuring that education and training outputs are more closely aligned tosocio economic development needs of the country.

In line with this strategic goal, the Human Resource Development Committee (HRDC) report on top occupations of 2020 has identified Control and Instrumentation as some of the priority skills for the Mining,Minerals, Energy and Water Resources**.**

The industry would greatly benefit from this TVET qualification as it responds to a critical, core and scarceskill as identified by the energy sector skills plan and provides an opportunity for artisans to access employment in the Measurement, Control and Instrumentation field.

PURPOSE:

The purpose of the qualification is to equip graduates with broad knowledge, skills and competencies to:

- Implement sustainable practices into instrumentation and control entrepreneurship, considering environmental stewardship and social responsibility, and develop strategies to communicate and market these efforts to stakeholders.
- Use of ICT for information retrieval and processing as well as Communication and Collaboration with others
- Design and construct electronic circuits with proficiency, addressing real time problems to practically implement solutions
- Employ final control elements to meet defined specifications
- Demonstrate the application of process measurement instruments utilized in the industry to effectively regulate a process variable, ensuring its stability at a predetermined value
- Demonstrate knowledge, skill and competence to engage in vocationally – relevant tasks, be it in anorganization or vocational context

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

- Certificate III, NCQF Level 3 (TVET/GE) or equivalent.
- There will be provision for RPL and CAT for entry according to the national RPL and CAT policy

SECTION B	QUALIFICATION SPECIFICATION
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Design and construct electronic circuits with proficiency, addressing real-time problems to practically implement solutions	1.1 Examine job specification to determine the devices and equipment to be used 1.2 Build digital and analogue circuits as per job specification. 1.3 Test digital and analogue circuits for functionality following industry practice. 1.4 Record and verify results in terms of measured versus expected values 1.5 Adherence to SHE requirements during the construction of circuits
2. Employ final control elements to meet defined specifications	2.1 Apply personal and plant safety precautions following standard practice. 2.2 Select test equipment according to the requiredaccuracy and range of control elements. 2.3 Identify the type and cause of errors of controlelements. 2.4 Calibrate control elements devices to an accuracy specified by the data sheet following the manufacturer's instructions. 2.5 Document test results following industry practice. 2.6 Complete maintenance and repairs to ensure continued serviceability of final control elements

3. Demonstrate the application of process measurement instruments utilized in the industry to effectively regulate a process variable, ensuring its stability at a predetermined value	3.1 Apply personal and plant safety precautions following standard practice. 3.2 Select test equipment according to the required accuracy and range of process measurement instruments. 3.3 Interpret measurement technology applying International Society of Automation (ISA) standards 3.4 Compare the methods and devices used inprocess variable measurement 3.5 Calibrate process measurement instruments to an accuracy specified by the data sheet following instructions. 3.6 Document test results following Industry practice.
4. Apply Information and Communication Technology for efficient information retrieval, processing as well as communication and collaboration within the context of tourism operations	4.1 Read and analyse data from a prepared database. 4.2 Enter and manipulate data using ICT tools. 4.3 Display data electronically through charts. 4.4 Manipulate and present information through the selection of appropriate spreadsheet tools
5. Demonstrate awareness of the basic entrepreneurial concepts associated with business establishment in Botswana.	5.1 Relate the basic entrepreneurial concepts that inform the establishment of a venture. This includes support structures or policies available for entrepreneurs in Botswana. 5.2 Identify entrepreneurship or business opportunities in a field of interest making use of brainstorming and environmental and scanning techniques. 5.3 Consider the various investment strategies and risks associated with your identified business.
6. Communicate effectively with stakeholders, communities, and team members, and understand the social and economic aspects of forestry management.	6.1 Demonstrate negotiation and communication skills before and during work-based learning 6.2 Perform assigned fundamental and core skills throughout the work-based learningprogram 6.3 Adhere to health and safety requirements at all times 6.4 Demonstrate problem-solving skills when problems are encountered during the work process 6.5 Contribute effectively to teamwork initiatives within the work environment

SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [ ]	***Level [IV]***	***Level [ ]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Entrepreneurship		***3***		***3***
	Information and Communication Technology		***3***		***3***
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Technical Mathematics II		4		4
	Digital Electronics		5		5
	Power Electronics I		5		5
	Process measurements		4		4
	Final control elements		4		4
	Work based learning/Attachment		32		32
STRANDS/ SPECIALIZATION	*Subjects/ Courses/ Modules/Units*	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [ ]	***Level [ ]***	***Level [ ]***	
1.					
2.					
Electives					

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
NCQF Level IV	***60***
TOTAL CREDITS	***60***
Rules of Combination: ***(Please Indicate combinations for the different constituent components of the qualification)***	
To be awarded this qualification, the candidate should achieve 60 credits; Fundamentals units 6credits, 22 credits for Core and 32 credits for Industrial Attachment.	

ASSESSMENT ARRANGEMENTS

The weightings for the assessment will be as follows:

1. Formative assessment
The weighting of formative assessment is 60% of the final assessment mark.

2. Summative Assessment
The weighting of the summative assessment is 40% of the final assessment mark.

Internal and external assessments are performed in the qualification. Both internal and external assessments are done in line with the national assessment policy expectations. Assessors must be registered with a recognized relevant regulatory body.

MODERATION ARRANGEMENTS

Internal and external moderation are performed in assessments for the qualification. Both internal and external moderation are done in line with the national moderation policy expectations. A moderator must be registered with a recognized relevant regulatory body.

RECOGNITION OF PRIOR LEARNING

There shall be provision for the award of the qualification through Recognition of Prior Learning (RPL) following institutional policies in line with the national RPL policy.

CREDIT ACCUMULATION AND TRANSFER

Credits Accumulated and Transfer will be applicable for gaining credits towards graduation and shall be carried out as per ETP policy which is aligned with BQA / national policy.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

LEARNING PATHWAYS

Horizontal Articulation

Graduates of this qualification may consider pursuing related qualifications in the following:

- Certificate in Metrology (Level 4)
- Certificate in Electronics (Level 4)
- Certificate in Control & Instrumentation (Level 4)
- Certificate in Mechatronics (Level 4)
- Certificate in Electrical Power Generation (Level 4)

Vertical Articulation

Graduates may progress to level V in but not limited to

- Certificate in Electronics engineering. (Level 5)
- Certificate in Electrical engineering. (Level 5)
- Certificate in Telecommunications. (Level 5)
- Certificate in Instrumentation and Control. (Level 5)
- Certificate in Radio & Television engineering. (Level 5)

Employment Pathways

Holders of this qualification can work as; but not limited to:

- Instrumentation Tradesman
- Instrumentation maintenance operative
- Assistant instrumentation artisan
- Assistant electrician
- Control room operator

QUALIFICATION AWARD AND CERTIFICATION

Minimum standards of achievement for the award of the qualification

A candidate is required to achieve the stipulated 60 credits inclusive of the 4 credits for fundamentals, 24 credits for core components and 32 credits for work-based learning credits for elective

Certification

A certificate will be awarded upon successful completion

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed qualification has 60 credits. The P & T Technology (Pty) Ltd South Africa as 120 credits**,** EIM International Training PTY LTD qualifications have 106 credits. New Zealand Institute of Skills and Technology has 70**.** Regardless of the disparities in credits the proposed qualification has the main exit outcomes and domains well outlined.

The qualification designed for Botswana generally compares well with the foreign qualifications noted above in relation to exit outcomes and content scope. The major differences are on the number of credits allocated.

In summary Instrumentation and Control artisans are also in high demand in the private sector. There is a high need in the private sector for an instrumentation and Control artisans with strong operations and machinery control skills.

The industry would greatly benefit from this TVET qualification as it responds to a critical, core and scarceskill as identified by the energy sector skills plan and provides an opportunity for artisans to access employment in the Measurement, Control and Instrumentation field.

REVIEW PERIOD

The qualification will be reviewed every 5 years as per NCQF regulations, or earlier should the need arise.

(Note: Please use Arial 11 font for completing the template)

For Official Use Only:

CODE (ID)			
REGISTRATION STATUS	**BQA DECISION NO.**	**REGISTRATION START DATE**	**REGISTRATION END DATE**
LAST DATE FOR ENROLMENT		**LAST DATE FOR ACHIEVEMENT**	
