QUALIFICATION SPECIFICATION										SECTION A
QUALIFICATION DEVELOPER	Ministry of Employment, Labour Productivity and Skills Development									
TITLE	Certificate III in Instrumentation and Control							**NCQF LEVEL**	3	
FIELD	Manufacturing, Engineering and Technology				**SUB-FIELD**			Instrumentation and Control		
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, 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. 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 on Education (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 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 Committee (HRDC) report on top occupations of 2016, has identified Control and Instrumentation as some of the priority skills for the Mining, Minerals, Energy and Water Resources**.** Based on the above-mentioned reports and wider stakeholder

consultation held, whereby industry was engaged; the feedback from the industry was for the review of the old curriculum so as to address the knowledge, skills and attributes in this area. Furthermore, due to shortage of competent artisans/graduate in the sector as evidenced by the high number of foreigners employed. Locals at these establishments are always not trained or available to install, maintain and repair instrumentation and control equipment in accordance with set standards, specifications and safety requirements. Therefore, it is important to develop a national qualification to address the mismatch within the industry, employability skills and competent graduate who could compete locally and globally.

PURPOSE

The purpose of the qualification is to equip candidates with competence to perform a range of functions including:

- the use of hand tools and equipment.
- technical drawing.
- soldering and de-soldering and assembly.
- testing of simple electronics circuits.
- application of instrumentation techniques.
- apply key skills in accordance with established codes of practice and relevant legislation.

People holding this qualification will 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)

Minimum entry requirement for this qualification is a:

NCQF level 2, Certificate II (General Education or TVET) or equivalent.

Recognition of Prior Learning (RPL):

There will be access through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) in accordance with the RPL and CAT National Policies.

QUALIFICATION SPECIFICATION SECTION B	
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA/ performance criteria**
Communicate with clients, colleagues and others using appropriate forms of communication techniques.	• Practice written, verbal, non-verbal communication appropriate to the target audience. • Interpret stipulated instructions or requirements • Apply information acquired in the performance of tasks or discussions with other people • Apply relevant definitions, terminology, abbreviations, and language. • Present information using appropriate language and formats. • Construct clear sentences to produce a written logical and coherent piece of writing. • Use appropriate presentation formats and styles of writing to produce error free business documents.
Utilize ICT for information retrieval and processing as well as communication and collaboration with others	• Practice ICT responsibly and ethically. Manage information using ICT. • Communicate and collaborate locally and globally using ICT. • Research, access and retrieve information using ICT. • Gather, analyse, and organise data and information using ICT • Organise and synthesize information using ICT. • Implement data loss prevention strategies using ICT • Present information in a variety of formats using ICT
Demonstrate knowledge and understanding of Safety, Health and Environmental Risks (SHER) and exhibit appropriate behaviors for	• Interpret and apply legislative requirements, industry standards, and best practices in a variety of workplaces

the protection of the environment, home, and workplace as well as personal health and safety	to achieve Safety, Health and Environmental Risks (SHER) compliance. • Identify hazards in the workplace that pose a danger or threat to own safety or health, or that of others. • Maintain a register of hazards and accidents in accordance with organizational requirements. • Discuss the importance of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors. • Apply appropriate action to control unsafe or unhealthy hazards and propose methods to eliminate identified hazards and risks.
Apply basic mathematical problem-solving techniques to perform work related calculations.	• Apply number operations to carry out work related calculations. • Determine ratios, proportions and percentages as needed for specific purposes. • Perform measurement techniques for length, area, perimeter, volume and mass when performing work related culculations. • Determine the cost of production in relation to labour, materials and overheads in project undertakings. • Identify the main features of work related data and use suitable summary statistics (mean, mode and median) to interpret the data. • Solve work related methametical problems through simple algebraic expressions
Perform basic mechanical workshop operations using suitable tools and equipment	• Select and use engineering materials in accordance with their characteristics and application. • Determine tools and equipment to be used in accordance with job specification.

	• Select appropriate tools and equipment to be used in line with the job requirements. • Carry out the tasks in line with job specification adhering to health, safety and quality standard. • Maintain tools and equipment in accordance with manufacturers' specification. • Clean and store tools and equipment in appropriate places after use in accordance with organizational requirements.
Draw and interpret sketches and engineering drawings.	• Draw sketches according to task requirements. • Read drawings to determine appropriate drawing tools and equipment to be used. • Select the appropriate drawing tools and equipment in accordance with job specification. • Produce drawings according to task specification adhering to health, safety and quality standard. • Perform quality checks on the job done for adherence to quality standard. • Clean tools and equipment and store them in appropriate places after use. • Clean or tidy work area in accordance with organizational requirements.
Maintain basic electrical circuits in accordance with established codes of practice and job specification.	• Examine electrical and electronics systems and components to identify faults or defects. • Determine materials, tools and equipment required for the job in accordance with the job specification. • Terminate cables in accordance with practice standards and job specification. • Connect circuits according to job specification and practice standards adhering to health, safety and quality standard.

	• Perform quality checks on work done and make improvements where necessary. • Test run the circuit to confirm functionality, record electrical quantities and take corrective actions as needed. • Clean tools and equipment and store them in an appropriate place after use in accordance with organizational requirements • Clean/tidy up the work area in accordance with organizational requirements.
Demonstrate an understanding of process measuring devices and units for a given process in accordance with established codes of practice and job specification.	• Examine the nature of work to be done to inform choice of tools and equipment to be used. • State process devices (Pressure, level, density, flow, temperature) in accordance with standard practice. • Convert Process units used in pressure, level, flow, density, temperature by calculation and tables in accordance with standard practice. • Clean tools and equipment and store them in appropriate places after use in accordance with organizational requirements • Clean/tidy up the work area in accordance with organizational requirements.

QUALIFICATION STRUCTURE		SECTION C	
	Title	**Level**	**Credits**
FUNDAMENTAL COMPONENT Subjects / Units / Modules /Courses	Communication skills	3	3
	Information and Communication Technology	3	3
CORE COMPONENT Subjects / Units / Modules /Courses	Basic Workshop Practice	3	10
	Basic Engineering drawings	3	5
	Electrical and electronics principles	3	7
	Basic Instrumentation systems	3	9
	Foundation Maths	3	3
ELECTIVE COMPONENT Subjects / Units / Modules /Courses	N/A	N/A	N/A
	GRAND TOTAL		**40**

Rules of combinations, Credit distribution (where applicable):

Candidates are required to achieve a total of 40 credits for the qualification inclusive of 6 credits for Fundamental units and 34 credits for Core units.

ASSESSMENT AND MODERATION ARRANGEMENTS

ASSESSMENT ARRANGEMENTS

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. The contribution of formative assessment to the final grade shall be **60%.**

Summative assessment

Learners 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.

MODERATION ARRANGEMENTS

Internal and external moderators to be engaged will be BQA accredited subject specialists in relevant fields with relevant industry experience and academic qualifications.

Both internal and external moderation shall be done in accordance with applicable policies and regulations.

RECOGNITION OF PRIOR LEARNING (RPL)

There shall be provision for award of the qualification through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) in accordance with institutional Policies in line with the National RPL and CAT Policy.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation

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

- Certificate III in Metrology
- Certificate III in Electronics
- Certificate III in Control & Instrumentation
- Certificate III in Mechatronics
- Certificate III in Electrical power Generation

Vertical Articulation

Graduates may progress to level 4 in:

- Certificate IV in Electronics engineering.
- Certificate IV in Electrical engineering.
- Certificate IV in Telecommunications.
- Certificate IV in Instrumentation and Control.
- Certificate IV in Radio & Television engineering.

Employment Pathways

Graduates attaining this qualification, may work as:

- 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 minimum of **40** credits inclusive of **6 credits for Fundamental** and **34 credits for Core components**, to be awarded the qualification.

Certification

Candidates meeting prescribed requirements will be awarded **Certificate III in Instrumentation and Control** in accordance with standards prescribed for the award of the qualification and applicable policies.

REGIONAL AND INTERNATIONAL COMPARABILITY

SGB Measurement, Control, and Instrumentation in **i**nstrumentation (level 3) (credit worth 131).

This qualification is intended to develop knowledge, skills, and competence in relation to the use and care for engineering hand and power tools, maintenance of field instruments and equipment, measurement, Control and Instrumentation processes, production and interpretation of instrumentation drawings, teamwork and documentation of control and instrumentation information.

Assessment strategies emphasise integrated approaches and performance-based assessments inclusive of application of key skills in line with the qualification exit outcomes and associated assessment criteria. This qualification can articulate directly to learning programmes and qualifications in the Measurement, Control, and Instrumentation field. It also opens the possibility for further learning in the sub-field of Engineering and related design. There is provision for candidates to achieve qualification through RPL.

In comparison The Botswana qualification and above qualification are similar in terms of tittle, main exit outcomes, domains, assessment strategies but differ on credit value awarded.

Electro Technology Training Organisation**:** New Zealand in National Certificate in Industrial Measurement and Control (Level 4) Credits 228.This qualification is intended to develop knowledge, skills, and competence in relation to safe work practices, electronics, industrial measurement and control theory, application of theory in practical work situations, writing short reports and a range of electives to suit individual work experience. Assessment strategies emphasise integrated approaches and performance-based assessments inclusive of application of key skills in line with the qualification exit outcomes and associated assessment criteria. Upon completion of this qualification graduates will be equipped with the underpinning knowledge that will support employment as an entry level technician in the industrial measurement and control servicing industries such as petrochemicals, energy generation and distribution, food products, water, and other utilities. Graduates of this qualification may progress to the New Zealand Certificate in process control and Automation (level 5).

In comparison, the above qualification only compares well with the proposed qualification as the content offered are similar. The differences are on credit value and level.

Electro Technology Training Organisation's National Certificate in Industrial Measurement and Control compares favorably with the SGB Measurement, Control, and Instrumentation qualification in terms of outcomes, assessment criteria, duration, and degree of difficulty. It has more credits as compared to the SGB Measurement, Control, and Instrumentation qualification.

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

REVIEW PERIOD

This qualification will be reviewed every 5 years.