SECTION A:	QUALIFICATION DETAILS																	
QUALIFICATION DEVELOPER (S)	GIPS																	
TITLE	CERTIFICATE IV IN DIESEL PLANT ENGINEERING														NCQF LEVEL	4		
FIELD	MANUFACTURING, ENGINEERING AND TECHNOLOGY			SUB-FIELD	DIESEL PLANT ENGINEERING										CREDIT VALUE	60		
New Qualification		✓		Review of Existing 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 diesel plant engineering industry is exposed to the consistently expanding new innovation of diesel technology and emission gas reduction strategies as the climate change battles intensifies. This requires

learning programs to be grown so learners entering this field of learning are acquainted with this new innovation at a beginning period of their vocation (GIPS: 2018). See Appendix B.

This Qualification reflects the workplace-based needs of the diesel electrical and electrical fitting sectors such as Locomotive and Motor Coach repair and maintenance, Millwrighting, etc. that is expressed by employers and employees as reflected by the needs assessment Appendix B. This Diesel Electrical Fitting and Electrical Fitting Qualification provides the intermediate competencies required to work on both diesel electric and electric machines. This Qualification provides the learner with accessibility to be employed within various industries and provides the flexibility to pursue different careers across various industry sectors, this is line with the National Development Plan 11 of turning Botswana into a knowledge-based economy.

With reference to the Human Resources Development Council skills development report, HRDC (2013) this Qualification provides learners with opportunities for professional development and career advancement within the diesel electrical and electrical fitting sectors such as Locomotive and Motor Coach repair and maintenance, Millwrighting, etc. Learners will be able to provide better and more efficient repair and maintenance services to their particular sector. It develops the fundamental competencies required by workers at an intermediate level. Qualifications at higher levels are designed to develop learners into fully fledged artisans and are based on the learning in this Qualification.

The competencies in this Qualification are applicable to a wide range of industries in line with Vision 2036 of the nation of Botswana of turning the nation into a knowledge-based economy, Vision 2036. This Qualification is the second in a series for learners who want to follow a career in the field of diesel, diesel electric and electrical fitting. This Qualification focuses on developing the knowledge and skills and attitudes necessary to function at an intermediate level and also offers the opportunity for learners to apply what they have learnt in a range of specialized areas.

PURPOSE:

The purpose of this Qualification is to equip learners with the standards and learning required to continue working and developing in various industries which use and maintain Diesel and Electric machines such as locomotives and motor coaches. It will also enable the further development of learners within this environment by providing articulation with higher level learning in this dynamic changing and challenging environment (HRDC:2013).

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

A learner acquiring this Qualification will be able to:

- Install and commission electrical equipment in a variety of diesel and electric machinery.
- Demonstrate the ability to test, fault find and maintain diesel and electric machinery.
- Demonstrate operational knowledge of mathematical, technological, and theoretical concepts during the execution of tasks with an ability to read, interpret technical drawings, sketch electrical/electronic wiring diagrams for diesel and electric machinery.
- Apply health, safety, and environmental procedures in order to comply with worksite and regulatory requirements.
- Demonstrate the ability to gather and interpret information from a range of sources and apply solutions to familiar problems related to working in the diesel and electric machinery environment with some scope for personal decision-making and responsibility.

ENTRY REQUIREMENTS (including access and inclusion)

I. Certificate III, NCQF level 3 (General Education or TVET) or Certificate III, NCQF level 3 (General Education or TVET) with Recognition of Prior Learning equivalent to at least 40 credits at NCQF level 3.

II. Apprentices with a letter of Apprenticeship Contract to start as 1st year.

III. Maturity Entry with BGCSE and a letter confirming on the job training in Automotive Vehicle Body Repair and Refinishing for a minimum period of 2 years with the same company.

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SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Communicate with peers and supervisors in an automotive work context.	1.1 Communicate effectively with specific reference to corporate communication, interpreting verbal and non-verbal communication, professional writing and handling small groups. 1.2 Use terminology that is appropriate to the situation and in accordance with normal workplace usage. 1.3 Access and interpret information related to work tasks from a range of written and oral sources to ensure that work requirements are understood. 1.4 Ensure communication is clear and unambiguous and at an appropriate level for designated target audiences. 1.5 Communicate information that is accurate and convey it in accordance with acceptable timeframes. 1.6 Utilize communication that is effective, regular, and ongoing.
2. Demonstrate an understanding of the fundamentals of engine technology.	2.1 Perform service operations on electrical systems. 2.2 Remove and refit electrical components in accordance with diesel plant equipment manufacturer's specifications and instructions. 2.3 Inspect diesel plant components to ensure optimal. operation
3. Maintain automotive workshop tools and equipment.	3.1 Select tools and equipment and be able to use them in accordance with their design and are appropriate for the task at hand.

	3.2 Source tools and equipment required for the scope of work from available supplies. 3.3 Check tools and equipment for condition prior to use. 3.4 Identify faulty tools and replace or repair them according to workplace procedures. 3.5 Use tools and equipment according to manufacturer operating guidelines
4. Access information from a range of written and oral sources to ensure that work requirements are understood.	4.1 Design the vehicle to make it safe to work with in accordance with manufacturer specifications. 4.2 Identify auto electrical features of the vehicle in relation to access to the faulty circuit. 4.3 Identify vehicle safety features in terms of precautions when working during operations. 4.4 Repair faulty circuits in accordance with workplace procedures. 4.5 Clean faulty components and dismantle them according to organizational requirements. 4.6 Conduct work with due consideration for other team members and overall productivity
5. Interpret information from different sources of technical data for use on diagnosis	5.1 Retrieve vehicle specifications with easiness 5.2 Minimize time for diagnosis in searching for required data. 5.3 Reduce damage to vehicles and components. 5.4 Achieve highest levels safety
6. Diagnose motor vehicle and components faults to determine course of action to rectify the faults	6.1 Observe safety measures to avoid mishaps. 6.2 Identify the faults quickly using proper use of diagnostic equipment.

	6.3 Apply theoretical concepts and principles for identification of the trouble causes. 6.4 Repair the faults accurately without trial and error
7. Identify and rectify heavy plant machinery faults	7.1 Dismantle and reassemble the main components of Compression Ignition (CI) engines – both 2- and 4-strooke in accordance with manufacturer's specifications. 7.2 Distinguish between two-stroke and four-stroke CI engines. 7.3 Remove major components from engine. 7.4 Dis-assemble major components. 7.5 Clean and identify all components. 7.6 Review the function of each component and check for wear with reference to manufacturer's specifications. 7.7 Re-assemble the major components, following the recommended procedure. 7.8 Assemble the subassembly, observing manufacturer's specifications. 7.9 Test the fitting of injection pump to an engine by the following mean: • Alignment of timing marks. • Spill-timing. 7.10 Describe the procedure for timing a Diesel engine.

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SECTION C	***QUALIFICATION STRUCTURE***					
	TITLE	***Credits Per Relevant NCQF Level***				***Total*** *(**Per** Subject/ Course/ Module/ Units)*
		Level [4]	***Level [5]***	***Level [6]***	***Level 7***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Engineering Science and Mathematics	*6*				*6*
	Engineering Drawing	*6*				*6*
	Introduction to Computers	*6*				*6*
	Introduction to business studies	*6*				*6*
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Diesel Plant Mechanics Technology	*6*				*8*
	Workshop Practice	*6*				*8*
	Industrial Attachment	*6*				*20*

ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses/ Modules/Units* *(choose 4)*						

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SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
4	***60***
TOTAL CREDITS	***60***

Rules of Combination:

(Please Indicate combinations for the different constituent components of the qualification)

The qualification consists of 520 credits distributed as follows.

Level and Credits	**Fundamental**	**Core**	**Elective**
Level 4…credits….60	**24 Credits**	**36 Credits**	**60 credits**
Total Credits	**24 Credits**	**36 Credits**	**60 credits**

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ASSESSMENT ARRANGEMENTS

ASSESSMENT

This qualification is assessed and moderated as follows:

Integrated Assessment:

Assessment practices must be open, transparent, fair, valid, and reliable and ensure that no learner is disadvantaged in any way whatsoever, an integrated assessment approach is incorporated into the qualification. Both formative and summative assessment processes are monitored during the qualification and to determine competence at the end of the qualification**.**

Summative assessment:

Integrated assessment, focusing on the achievement of the exit-level outcomes, will be done by means of a written examination (of at least 3 hours) at the end of every module (per module) which will contribute 40 % to their final assessment mark.

Professional Practice: All learners will go through the work placement. Tutor assigned to student will visit the intern at workplace and do the evaluation. (15%). A second visit at the intern place is conducted and evaluation is completed (15%). Supervisor evaluates the intern and submits a report to the tutor (20%). At the end of professional practice, student will submit a project report (50%). All the marks from the internship, tutor visits, supervisor evaluation of intern and report will be captured in the form called ‘internship report feedback form’. Monitoring of learners’ during internship is done using weekly logbook.

Formative assessment:

Learners are continuously assessed through practical tests, presentations, assignments, informal class test and formal modular tests.

Learners are continuously assessed through:

- Mid-semester exam 30 %

- Class assignments 30%

Pass requirements:

- Examination (worth 40%) for modules with Practical's OR 50% for modules without Practical's)
- Mid - term (worth 30% for modules with Practical's OR 25% for modules without practical's)
- Assignment (1) worth 30% for modules with practical's OR 25% for modules without practical's)

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MODERATION ARRANGEMENTS

Pre-assessment Moderation:

This moderation is carried before assessment tasks are given to students. All submitted sets of question papers and marking keys are shared with the moderators. Each assessment pack should be moderated by two Moderators where possible. The question paper moderation report should be filled in for each question paper. Moderator report will be shared with question paper setter so that moderator feedback will be considered when finalizing the question paper. All Moderators must be registered and accredited with Botswana Qualification Authority (BQA)

Post-assessment moderation or moderation of marking:

Moderation of completed assessment tasks is categorized as post-assessment moderation. It is carried out after assessment tasks have been marked. The set of answer scripts and marking keys are shared with the moderators. At least 10% of the answer scripts in a module should be moderated during post assessment moderation**.**

Both internal and external moderation will be done in-line with the Moderation policy of the Institution. In addition, all Moderators and Assessors must be registered and accredited with Botswana Qualification Authority (BQA).

RECOGNITION OF PRIOR LEARNING

Recognition of prior learning (RPL) will be considered for the award in the Certificate IV in Diesel Plant Engineering. RPL is conducted in accordance with the institutional Recognition of Prior Learning Policy. This Policy provides processes and procedures by which RPL is conducted. RPL will be carried out in accordance with the policy of the institution and relevant national-level policy and legislative framework. This implementation will be consistent with the requirements of relevant national or international professional bodies

CREDIT ACCUMULATION AND TRANSFER

Any candidate applying for Credit Accumulation and Transfer (CAT) will be expected to provide evidence of such learning that must be relevant, sufficient, valid, verifiable, and authentic

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

ACADEMIC PATHWAYS

Learners who have graduated with a Certificate in *Diesel Plant Engineering* can proceed to do the following: -

LEARNING PATHWAYS

Vertical Articulation

- Degree in Diesel Plant Engineering
- Degree in Automotive Engineering
- Degree in Mechatronics
- Degree in Mechanical engineering
- Diploma in Diesel Plant Engineering
- Diploma in Automotive Repair
- Diploma in Automotive Motor Mechanic
- Diploma in Electronics engineering
- Diploma in Mechatronics

- Diploma in Automotive Management
  - Diploma in Marketing
  - Diploma in Human Resources

Horizontal Articulation

- Certificate V in Automotive Repair and Maintenance
- Certificate V in Automotive Diagnostics and Repair
- Certificate V in Electronics Engineering
- Certificate V in Automotive Management
- Certificate V in Workshop Management
- Certificate V in Marketing
- Certificate V in Human resources

CAREER PATHWAYS

The jobs within the Diesel Plant Engineering could be any of the following.

- Technical support Engineer
- Engine Calibration Engineer
- Fuel test Engineer
- Automotive project manager
- Interior Automotive Design Engineer
- Workshop manager
- Service Advisor
- Diesel Mechanic
- Training Officer
- Manpower Development officer
- Plant Engineer

- Assistant lecturer
- Workshop receptionist
- Fleet manager

QUALIFICATION AWARD AND CERTIFICATION

The learner will be awarded a Certificate in Diesel Plant Engineering after attaining 60 credit value as specified in the rules of combination and credit distribution. This qualification does not have compensatory awards.

REGIONAL AND INTERNATIONAL COMPARABILITY

This qualification compares with the following:

This **Certificate in Diesel plant Engineering** was compared with equivalent courses/Qualifications from a range of countries. However, Canada is the best country for comparison as their railway industry uses the same type/make of diesel and electric machines as Botswana. However, other countries were selected because they offer education and training that is also considered international best practice in terms of diesel electric fitting and electric fitting' for diesel and electric machines. These countries are Australia, United States of America, and New Zealand.

This qualification compares favorably with qualifications in Canada and South Africa. They all focus on training learners and providing them with knowledge and skill to operate, maintain and repair all forms of transportation.

Similarities

All the qualifications have similar assessment strategies including class assessments, practical tests, presentations, formal modular tests etc. Another similarity can be seen in the employment pathway with all the qualifications selected citing jobs in the Engineering Fields. More so, the progression pathways are the same with the holders of the certificate in Certificate in Diesel plant being able to pursue higher qualifications in engineering. Also, the graduates follow similar employment paths.

Differences

There notable difference is on the modules on offer. Most other countries have a streamlined qualification process that ends in a required result but does not recognize competence in parts of the qualification. This has

been identified as a problem in the Botswana context, and that was why the move to the NCQF, and unit standards was made. Through achieving this qualification, learners will be given recognition for their abilities after just after completing their certificate.

See Appendix Section of the accompanying documents for the Comparison Matrix.

REVIEW PERIOD

This Qualification will be reviewed after every 5 years.

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