QUALIFICATION SPECIFICATION									SECTION A
QUALIFICATION DEVELOPER	RAVOS Technical College								
TITLE	Certificate V in Refrigeration and Air-Conditioning					**NCQF LEVEL**	5		
FIELD	Manufacturing, Engineering and Technology			**SUB-FIELD**	Refrigeration and Air-Conditioning				
New qualification	✓		Review of existing qualification						
SUB-FRAMEWORK	General Education		TVET	√	Higher Education				
QUALIFICATION TYPE	Certificate	√	Diploma		Bachelor				
	Bachelor Honours		Master		Doctorate				
CREDIT VALUE	120								

RATIONALE AND PURPOSE OF THE QUALIFICATION

Rationale

Botswana is one of the Developing countries in the SADDC block with its major national income from mining. Tourism and Agriculture are some of the secotors which support the economic base of the country. Refrigeration and Air Conditioning Technology is therefore indispensable for economic development of the country by supporting the above and many other economic sectors. Being a semi-desert and a dependant from neighbouring countries on food, Botswana has great need of trained human resources in Refrigeration and Air Conditioning to support the Agriculture base, Mining, Touring, Constructions, Transport and many other sectors of the economy. This Certificate qualification is in response to the increasing demand of competent Refrigeration and Air conditioning human resource skills in the above and many other sectors of the economy through the **Human Resource Development Council (HRDC)** call for the recruitment and training of technicians in Refirigeration and Air Conditioning.

The initiative to develop Refrigeration and Air-conditioning Certificate Qualification is supported in Botswana Government Policies. The Government of Botswana has increased its commitment of aligning Refrigeration and Air-conditioning Development with policies such as the Education and Training Sector Strategic Plan (ETSSP2015- 2020), National Development Plan 11, Vision 2036, National Human Resource Development Strategy (2009 -2022), and the Sustainable Development Goals (2016-2030). All these policies recognise Refrigeration and Air-conditioning development and education as one of hes key areas in the development

of the human capital.

Purpose

The purpose of the Certificate V in Refrigeration and Air-Conditioning is to produce skilled people who will be able to:

- Install and maintain air-conditioners.
- Install and maintain cold rooms and freezer rooms.
- Carry out trouble shooting, repairs and servicing of refrigeration and air-conditioning equipment.

ENTRY REQUIREMENTS (including access and inclusion)

MINIMUM ENTRY

- The minimum entry requirement for the Certificate V in Refrigeration and Air-Conditioning is NCQF Level IV.

RPL & CATS

- There will be provision for access through RPL and CATS for learners who do not meet the minimum entry requirements, who have been exposed to refrigeration and air-conditioning industry.

QUALIFICATION SPECIFICATION **SECTION B**	
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
• Demonstrate knowledge and understanding on Refrigeration and Air-conditioning systems or Mechanism.	• Explain various applications for mechanical refrigeration and air-conditioning system • Name the basic of mechanical refrigeration system • Explain the compression cycle for a domestic refrigeration • List the components of a refrigeration compression system • Describe the five principal types of refrigerant controls and their operation • Name four different types of compressors • Explain how compressors operate.
• Select and use hand tools in a correct and safe manner and set out and form pipe runs for refrigeration and air-conditioning mechanisms	• Approach a problem in a logical and systematic sequence • Demonstrate the proper servicing and repairs procedure • Discuss the evacuation and purging of a system • Select the proper tools for servicing and maintaining • Explain how to use various hand tools.
• Demonstrate skills and knowledge on how to deal with electrical appliances in a safe manner	• Define the terms electricity and electrons • Explain the difference between direct and alternating current • Describe the difference between parallel circuits and series circuits • Use various electrical formulas to solve problem • Identify and use the proper electrical symbol • Identify the dangers associated with the use of electrical equipment • Describe the procedure for testing the correct operation of electrical test equipment.
• Demonstrate knowledge and understand on how to take care of the self and working personnel to	• Carry out safe working practices to prevent hazards and to ensure the safety of working personnel and members of the public

avoid injuries in the work place and also to take care of the environment when dealing with hazardous gases.	• Select and use protective clothing and safety equipment for specific tasks • State the impact of releasing the refrigerants from the system • Proper handling and transporting of refrigerants
• Demonstrate skills and understand on how to use tools and materials when dealing with motors.	• Use various electrical testing instrument to check motor windings, shorts, and ground • List several types of electric motor • List and describe devices that protect motors from overloads and overheating
• Demonstration knowledge and Skills on how to draw various components of refrigeration and Air-conditioning.	• Sketch tool • Draw various components and accessories • Differentiate types of electrical and mechanical symbols • Draw circuits and their symbols
• Demonstrate the skills and knowledge on how to repair, troubleshoot and install various types of air conditioners.	• Interpret the procedures of diagnosing faults on air-conditioning units • Illustrate the procedure for installing and servicing the following types of m air-conditioning: · Split unit · Central unit · Automobile · Package units
• Demonstrate skills and knowledge on how differentiate types of pipes used in air-conditioning and refrigeration applications.	• List the different types of tubing used in heating, air-conditioning, and Refrigeration • Describe common ways of cutting, bending swaging flaring brazing, and methods of fittings tubing's.

QUALIFICATION STRUCTURE **SECTION C**			
FUNDAMENTAL COMPONENT Subjects / Units / Modules /Courses	**Title**	**Level**	**Credits**
	CSS- Communication & Study Skills	**5**	**5**
	FCA- Introduction to Fundamental Computer Applications	**5**	**5**
CORE COMPONENT Subjects / Units / Modules /Courses	TM-Technical Maths	**5**	**20**
	RAT-Refrigeration and Air-conditioning Technology	**6**	**20**
	TD-Technical Drawing	**5**	**20**
	RAP-Refrigeration and Air-conditioning Practical's	**6**	**20**
	IA-Industrial Attachment	**6**	**20**
	RM- Research Methodologies	**5**	**10**
ELECTIVE COMPONENT Subjects / Units / Modules /Courses	**N/A**		

Rules of combinations, Credit distribution (where applicable):

A trainee must successfully complete a total of one hundred and twenty (120) credits of competency, consisting of:

1. One hundred and ten (110) credits of the Core modules and

2. Ten (10) credits of the Fundamental modules.

3. No electives available.

ASSESSMENT AND MODERATION ARRANGEMENTS

Assessment Arrangements

Assessments will be carried out by BQA accredited assessors who are also experts in the field.

Weightings for Assessments will be as below:

Formative Assessment : 40%

Summative Assessment: 60%

Moderation

There will be Internal and External Moderation and should be carried out by BQA accredited moderators who are also experts in the field.

RECOGNITION OF PRIOR LEARNING (if applicable)

Candidates can gain part or whole qualification through the application of Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer CAT policies which is in line with National Policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Learning Pathways

Vertical Articulation

After attaining the Certificate in Refrigeration and Air-conditioning, candidates can progress to:

- Diploma/ Advanced Diploma in Refrigeration and Air-conditioning.
- Diploma in Mechanical Engineering.
- Diploma in auto- electrical engeenering.

Horizontal progression

After successfully passing this Certicate Course, the candidate can progress to do:

- Certificate V in Electrical and Electronics.
- Certificate V in Auto- Electrical Engeenering.

Employment Pathways

Graduants can be employed as:

- Field Service Technician
- Service Managers
- Field Service Supervisor

- Field Installers
- Project Managers
- Lab Technicians
- Controls technician
- Educational Administrator
- Sales Manager

QUALIFICATION AWARD AND CERTIFICATION

To be awarded a Certificate in Refrigeratin and Air Conditioning, candidates will have to attain 120 credits prescribed for the qualification comprising of both fundamental and core component modules.

Certification

Certification is done after all satisfactory completion/passing of all Modules as specified above. Statement of results is prepared and finally a Certificate is issued.

REGIONAL AND INTERNATIONAL COMPARABILITY

This Certificate in Refrigeration and Air Conditioning compares well with both regional and international similar qualifications as specified below. The Modules are similar to the ones offered by many accredited institutions in the region and internationally. This uniformity is ideal for setting a standard against which we can quickly compare our Qualification.

The similar fundamental modules offered by the developer and the three institutions are Communication and Computer skills.

This qualification has thus been aggressively compared to similar qualifications from the following institutions:

1. AIRCONDITIONING AND REFRIGERATION ACADEMY (e-mail: info@acra.co.za)

Founded in 1951, Airconditioning and Refrigeration Academy (**ACRA**) is one of the best Refrigeration and Air Conditioning Training Institution in South Africa. The Academy has the resources to train all aspects of Air conditioning and refrigeration field up to NQF Level 4 and Trade Test. The emphasis is in the training of apprentice/learner ships, artisans and technicians as well as aspects for management technical knowledge. The training is specialized to the field of Refrigeration, conditioning and ventilation. The Academy carries full

accreditation for the training of apprenticeships, learnerships and training courses in air conditioning and refrigeration levels 2 through to 4, as well as QCTO (Quality Council for Trades & Occupations), NAMB (National Artisan Moderation Body). The School offers the following modules which are similar to our modules:

- Air Conditioning and Refrigeration Technology
- Electrical 1 course (Air conditioning and Refrigeration Electrical)
- Air conditioning and Refrigeration technology course
- Refrigeration and Air Conditioning Electrical 2 course
- Authorized Refrigeration Practitioner Course
- Refrigeration and Air Conditioning Electrical 3 Course.
- Air Con and Refrigeration Technology 3 Course
- Apprenticeships & Learner ships

2. Ammonia Training Solutions South Africa. (http://www.ammoniatrainingsolutions.co.za)

This is yet another regional institution based in South Africa which offers credible accredited Certificate Refrigeration Qualifications which favaourably compares well with our qualification.

3. Bulawayo Polyetechnic- Zimbawe (http:www.bulawayopolytecnic.ac.zw)
The Cerificate in Refrigeration and A
offered by this Collge compares favourably with our Certificate Qualification.

4. Kenya Institute of Professional Studies (School of Engineering) (http://www.kips.ac.ke)

This School run many courses including Refrigeration and Air conditioning. All courses in the Engineering Department follow the modular program in which there is a good blending between theory and practice. These courses are examined by the Kenya National Examinations Council.
Our Qualification compares very well with Certificate Qualification offered at this College.

5. City And Guilds of London Institute (http://www.cityandguilds.com)
City and Guilds is one of the International leaders in Refrigerationa and Air Conditioning Training.

This Certificate in Refrigeration and Air conditioning Qualification has been heavily benchmarked on their Certification in Refrigeration Qualification.

REVIEW PERIOD
The Qualification shall be reviewed after five years.