No. 1059 **10 September 2004**

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

In accordance with regulation 24(c) of the National Standards Bodies Regulations of 28 March 1998, the Standards Generating Body (SGB) for

Air-conditioning, Refrigeration and Ventilation

Registered by NSB 06, Manufacturing, Engineering and Technology, publishes the following qualification and unit standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the qualification and unit standards. The qualification and unit standards can be accessed via the SAQA website at **www.saqa.org.za**. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, Hatfield Forum West, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the unit standards should reach SAQA at the address ***below and no later than 10 October 2004.*** All correspondence should be marked **Standards Setting – SGB for Air-conditioning, Refrigeration and Ventilation** and addressed to

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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:

National Certificate: Air-conditioning, Refrigeration and Ventilation

SAQA QUAL ID	*QUALIFICATION TITLE*	
48959	National Certificate: Air-conditioning, Refrigeration and Ventilation	
SGB NAME	SGB Air-conditioning Refrigeration and Ventilation	
ABET BAND	*PROVIDER NAME*	
Undefined		
QUALIFICATION CODE	*QUAL TYPE*	*SUBFIELD*
MET-2-National Certificate	National Certificate	Manufacturing and Assembly
MINIMUM CREDITS	*NQF LEVEL*	*QUALIFICATION CLASS*
147	Level 2	Regular-Unit Stds Based
SAQA DECISION NUMBER	*REGISTRATION START DATE*	*REGISTRATION END DATE*

PURPOSE OF THE QUALIFICATION

People who achieve this qualification will be recognized for their ability to work under supervision in the carrying out of routine tasks in the air-conditioning, refrigeration and ventilation industry and to recognize and identify component parts of plant and equipment.
Qualifying candidates are encouraged to continue their learning paths to a minimum of the NQF Level 3 qualification in air-conditioning and ventilation or refrigeration.

Rationale for the qualification
This is the first qualification in a series for learners following a career in air-conditioning, refrigeration and ventilation. This is a growth industry and there is a demand for workers with technical skills for manufacturing, installing, maintaining and repairing equipment.
For those who have been active in the industry for a period of time, this qualification represents part of the RPL process to acknowledge skills acquired without the benefit of formal education or training.
The qualification also forms the basis for further development and has been designed to articulate directly to learning programmes and qualifications in air-conditioning, refrigeration and ventilation at NQF Level 3, NQF Level 4 and higher levels

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

This qualification assumes that the candidate has already achieved a National Certificate at NQF level 1, ABET Level 4 or Grade 9 school level.
In particular, the following learning is assumed to be in place prior to embarking on learning towards this qualification
> Basic literacy and numeracy
> Basic concepts of science and technology

Recognition of prior learning
Whether a candidate attends formal courses or acquires the required skills through informal means, the same standards apply as per the matrix of unit standards. The qualification and the standards have been written in such a way that the learning has to be assessed in an integrated way. Assessors will assess evidence to establish what the learners know and can do. Such evidence may be gathered through course related activities and/or through work related activities. In cases where candidates do not attend formal courses, assessors should seek work related evidence as far as possible.
Where courses are provided for learners, institutions can use the unit standards and this qualification to assess learning achievements.
For candidates who are not able to achieve the outcomes, providers can then use the standards and qualification to determine a specific learning programme to suit the candidate's learning needs.

QUALIFICATION RULES

N/A

EXIT LEVEL OUTCOMES

1. Identify and handle refrigerants
2. Identify and use basic tools
3. Identify and work with component parts for air-conditioning, refrigeration and ventilation equipment
4. Understand the basic operation of air-conditioning, refrigeration and ventilation systems
5. Work safely and responsibly in the plant environment.

The qualification also addresses the following critical cross-field outcomes:

> Identify and solve problems and make decisions using critical and creative thinking
> Work effectively with others as members of a team, group, organization or community
> Organize and manage themselves and their activities responsibly and effectively
> Collect, analyse, organize and critically evaluate information
> Communicate effectively, using visual, mathematical and/or language skills in the modes of oral and/or written persuasion
> Use science and technology effectively and critically showing responsibility towards the environment and health of others
> Demonstrate an understanding of the world as a set of related systems by recognizing that problem-solving contexts do not exist in isolation

ASSOCIATED ASSESSMENT CRITERIA

The assessment criteria for each unit standard are to be used by the assessor as the basis for assessment judgments, first in relation to each unit standard, and then in relation to integration at exit outcome level.

Integrated assessment
Assessors will require evidence of competence in terms of each unit standard indicated in the matrix of unit standards required for this qualification. The assessment criteria for each unit standard will serve as the standard against which assessors must make their assessment judgments. When assessors are satisfied that the criteria have been met for each unit standard, assessors must ensure there is sufficient evidence of the ability to integrate the full range of skills required in order to commission, fault find and maintain air-conditioning and ventilation or refrigeration plants and systems. This evidence could be collected through:
> Observations in a simulated environment
> Observations during work or participation in work related activities
> Questions designed to test understanding and knowledge in terms of each unit standard's requirements, and the ability to integrate at qualification level.
> Records and reports compiled as part of assessment portfolios.
Moderators will check integration of all assessments at qualification level. This could include observing individual assessment.

INTERNATIONAL COMPARABILITY

This qualification compares favourably with the following international qualifications:
> New Zealand Qualifications Authority/NZEFMITO

ARTICULATION OPTIONS

N/A

MODERATION OPTIONS

Moderation of assessments must take place whenever assessments are carried out at qualification level. Moderators must also be accredited for the particular sub-field and have knowledge and experience of air-conditioning, refrigeration and ventilation.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

Assessor will have to be registered as assessors by the relevant ETQA in line with SAQA's registration requirements. In terms of assessment expertise, assessors will need to prove competence in line with the unit standards for assessors.

In terms of technical expertise, assessors will need to demonstrate evaluative ability in relation to the unit

standards they assess. By evaluative ability is meant the assessor need not necessarily have the psych-motor skills needed to achieve each unit standard they assess themselves, but that knowledge and experience that enables them to make fair, valid and reliable judgments of the candidate's ability relative to the unit standard at hand.

NOTES

This qualification replaces qualification, 20719, "National Certificate in Air Conditioning, Refrigeration and Ventilation", Level 2, 147 credits.

UNIT STANDARDS
(Note: A blank space after this line means that the qualification is not based on Unit Standards.)

	UNIT STANDARD ID AND TITLE	LEVEL	CREDITS	STATUS
Core	116224 Explain the operation of basic vapour compression refrigeration systems, and identify and explain the function of the components and accessories as well as their retrieval and storage procedures	Level 2	8	Draft - Prep for P Comment
Core	116226 Identify and set ON-OFF control devices as used in air conditioning and refrigeration systems, explain their operation and discuss their application and fault finding	Level 2	6	Draft - Prep for P Comment
Core	116230 Identify materials, piping, fitting, jointing methods and insulation materials used for air-conditioning and refrigeration installations	Level 2	4	Draft - Prep for P Comment
Core	116232 Demonstrate understanding of fundamentals of electricity and its application in air conditioning, refrigeration and ventilation equipment	Level 2	4	Draft - Prep for P Comment
Core	116234 Identify and apply fixing methods for piping, ducting and equipment used in the trade of air-conditioning, refrigeration and ventilation	Level 2	6	Draft - Prep for P Comment
Core	116236 Define and explain the principles of thermodynamics and carry out basic calculations involving heat	Level 2	5	Draft - Prep for P Comment
Core	116238 Clean air-conditioning, refrigeration and ventilation plants, components and work sites	Level 2	4	Draft - Prep for P Comment
Core	116239 Identify, use and maintain hand tools and measuring instruments used in the air-conditioning, refrigeration and ventilation trades	Level 2	12	Draft - Prep for P Comment
Core	116241 Work Safely and use safety equipment when carrying out mechanical or electrical work on air conditioning, refrigeration and ventilation installations	Level 2	7	Draft - Prep for P Comment
Core	116243 Install, connect and maintain electrical cables and conductors as applied in air conditioning, refrigeration and ventilation installations	Level 2	6	Draft - Prep for P Comment
Core	116244 Sketch and construct electrical circuits applicable to single-phase air conditioning, refrigeration and ventilation installations	Level 2	9	Draft - Prep for P Comment
Core	116334 Identify refrigerant containers, explain handling procedures and discuss the use of refrigerants	Level 2	3	Draft - Prep for P Comment
Core	116335 Identify, use and maintain refrigeration trade specific tools and instruments	Level 2	8	Draft - Prep for P Comment
Core	9389 Join and install refrigerant piping	Level 3	9	Registered
Core	116223 Demonstrate knowledge of the OHS Act as it applies to employees in the air-conditioning, refrigeration and ventilation industries	Level 3	3	Draft - Prep for P Comment
Elective	9266 Install self propelled transport refrigeration systems	Level 2	4	Registered
Elective	9328 Behave in the proper manner under working conditions	Level 2	4	Registered
Elective	114939 Identify causes of stress in own life and indicate techniques to manage it	Level 2	2	Registered
Elective	116233 Identify and state application of belt drives, couplings,gearboxes and bearings used on air-conditioning, refrigeration and ventilation plants and recognize misaligned, mismatched and worn components	Level 2	6	Draft - Prep for P Comment
Elective	116245 Perform basic arc welding of metals as applicable to air-conditioning, refrigeration and ventilation installations	Level 2	4	Draft - Prep for P Comment
Elective	116355 Handle refrigerant containers and transfer refrigerants into service cylinders	Level 2	3	Draft - Prep for P Comment
Fundamental	7469 Use mathematics to investigate and monitor the financial aspects of personal and community life	Level 2	2	Registered
Fundamental	7480 Demonstrate understanding of rational and irrational numbers and number systems	Level 2	3	Registered
Fundamental	8962 Maintain and adapt oral communication	Level 2	5	Registered
Fundamental	8963 Access and use information from texts	Level 2	5	Registered
Fundamental	8964 Write for a defined context	Level 2	5	Registered
Fundamental	8967 Use language and communication in occupational learning programmes	Level 2	5	Registered
Fundamental	9007 Work with a range of patterns and functions and solve problems	Level 2	2	Registered

Fundamental	9008 Identify, describe, compare, classify, explore shape and motion in 2-and 3-dimensional shapes in different contexts	Level 2	3	Registered
Fundamental	9009 Apply basic knowledge of statistics and probability to influence the use of data and procedures in order to investigate life related problems	Level 2	4	Registered
Fundamental	9322 Work in a team	Level 2	3	Registered
Fundamental	12457 Develop learning strategies and techniques	Level 3	3	Registered

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:

National Certificate: Air-Conditioning, Refrigeration and Ventilation

SAQA QUAL ID	QUALIFICATION TITLE	
48963	National Certificate: Air-Conditioning, Refrigeration and Ventilation	
SGB NAME	SGB Air-conditioning Refrigeration and Ventilation	
ABET BAND	PROVIDER NAME	
Undefined		
QUALIFICATION CODE	QUAL TYPE	SUBFIELD
MET-3-National Certificate	National Certificate	Manufacturing and Assembly
MINIMUM CREDITS	NQF LEVEL	QUALIFICATION CLASS
186	Level 3	Regular-Unit Stds Based
SAQA DECISION NUMBER	REGISTRATION START DATE	REGISTRATION END DATE

PURPOSE OF THE QUALIFICATION

The air conditioning, refrigeration and ventilation industry provides a service to many sectors of he country's economy such as food processing and warehousing; food transportation, distribution and retailing; deep level mining and industrial process; high rise and retail property; specialized medical care; automotive and mass transport; tourism and hospitality.
This qualification provides the learner with the skills required to repair, maintain and install mechanical / electrical equipment and systems in the air conditioning, refrigeration and ventilation sub-field in a variety of applications, working without direct supervision.

The current rate of urban development, the advance in technology and development of tourism creates an ever-increasing demand for air conditioning, refrigeration and ventilation equipment and systems and therefore a corresponding demand for technicians to repair, maintain, install and manufacture such equipment and systems.
The technical skills required for this purpose are scarce and there is a growing demand for technicians skilled in the mechanical, electrical and thermal sciences. These qualifications are ideally suited to school-leavers (male and female) who have an interest in the engineering sciences and have practical skills. This series of qualifications also equips the learner with entrepreneurial skills which would lead to self employment in the SMME field (Most businesses in the field of air conditioning, refrigeration, and ventilation are in fact SMME's).

South Africa is the only country in Sub-Saharan Africa which has established qualifications and a network of training providers countrywide. South African trained technicians are the obvious choice for work in this field in all African countries north of our borders. We also see an untapped potential for training of learners from NEPAD countries which would assist in the further development of our training resources.

This qualification specifically suits learners who have an interest in science and mathematics as well as manual dexterity (ability to use tools) and a consciousness of personal and environmental safety. It is also suitable for workers who have had several years of practical experience working in the air conditioning, refrigeration and ventilation industry who have the practical skills but lack the formal learning required in the qualification and who have a level of competence equivalent to the NQF level 2 qualification in air conditioning, refrigeration and ventilation as determined in formal assessment by an assessor who meets the criteria for the registration of assessors.
To achieve competence in this qualification the learner must be able to:
> Apply mathematical literacy skills to carry out the required calculations at this level related to the work process and basic finance.
> Communicate effectively with others at all levels and behave in an appropriate manner under work related circumstances displaying teamwork qualities
> Be able to give instructions, read and understand drawings and diagrams related to his work.
> Be able to use and supervise the use of power tools, equipment and instruments, accurately and safely.
> Be conscious at all times of the need to work safely in an industrial environment and understand the

requirements of the OSH Act in the workplace.
> Understand the operation of the vapour compression refrigeration system and it's components, electrical and control devices and be able to find faults and repair/replace parts.
> Use the knowledge of the various materials and accessories in an air conditioning, refrigeration or ventilation system to carry out installations.
> Have knowledge of the systems and processes that he has elected to include in his learning program.

Rationale for the qualification.

Air conditioning, refrigeration and ventilation are subfields of specialized engineering which account for the design, manufacture, installation, maintenance, and repair of systems which provide artificial cooling for the environment to improve comfort and productivity and the processing and preservation of foodstuffs. The development of the urban lifestyle with its concentration of population into centralized areas, the food chain from producer to consumer as well as the working environment and medical care would not be possible without these specialized engineering services.

This is the second qualification in a series of qualifications which will lead to a learner acquiring all the skills required to work in the industry in the repair, maintenance, installation, manufacture and ultimately design of the mechanical / electrical systems which provide temperature control for environmental or process needs. Qualification at this level will be the equivalent of a learner passing a trade test under the apprenticeship of commercial or industrial refrigeration mechanic.

NQF level-credits-title-technical competence
2-145-Learner Mechanic-Has a basic understanding of equipment and is able to carry out technical work under supervision.
3-186-Refrigeration Mechanic / Journeyman-Has a knowledge of equipment and systems and is able to carry out technical work without supervision.
4-149-Technician-Has an advanced knowledge of systems and equipment and is able to supervise technical work
5-136-Senior Technician /Project Leader-Has a knowledge of system design, selection and engineering and has management skills.

The learner will be required to reach competence in the advanced skills of the use of tools of the trade, practice of workplace safety, finding and repair of mechanical and electrical plant faults, installation and dismantling of plants, reading and interpretation of drawings and diagrams. He will be required to lead a work team and communicate at all levels in the workplace.
There are many applications of air conditioning, refrigeration and ventilation which relate directly to the tourism and hospitality industry:
> Air conditioning of hotels, restaurants and recreation areas.
> Air conditioning of luxury buses, automobiles and other transport modes.
> Refrigeration related to the food chain (producers, processors, warehouses, transport, retailing).
The 2010 events and subsequent increase in level of tourism will create further demand for the services of trained technicians to install, service and repair cooling equipment.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

This qualification assumes that the candidate has already achieved one of more of the following:
> National Certificate in Air conditioning, Refrigeration and Ventilation at NQF level 2 (NLRD 20719)
> FETC (Further Education and Training Certificate) has an interest in mathematics, science and technology and practical ability in the use on tools and equipment in mechanical and electrical engineering.

Recognition of prior learning

Whether a candidate attends formal courses or acquires the required skills through informal means, the same standards apply as per the matrix of unit standards. The qualification and the standards have been written in such a way that the learning has to be assessed in an integrated way. Assessors will assess evidence to establish what the learners know and can do. Such evidence may be gathered through course related activities and / or through work related activities. In cases where candidates do not attend formal courses, assessors should seek work related evidence as far as possible.
Where courses are provided for learners, institutions can use the unit standards and this qualification to assess learning achievements.

For candidates who are not able to achieve the outcomes, providers can then use the standards and qualifications to determine a specific learning program to suit the candidates learning needs.

QUALIFICATION RULES

N/A

EXIT LEVEL OUTCOMES

> Demonstrate in the process of assessment the use of appropriate mathematics literacy and financial skills and the skills in written and oral communication applicable to the workplace and life in general

> Demonstrate and explain the use of power tools and other equipment in the installation and dismantling of air conditioning, refrigeration and ventilation plants always applying safe working practice.

> Explain the operation of the vapour compression refrigeration cycle and it's components in relation to the operating parameters of refrigeration plants.

> Demonstrate the ability to find and repair faults in a refrigeration system.

> Demonstrate the ability to understand drawings, diagrams and specifications and write reports.

> Explain and use the elective skills which are selected.

Critical Cross-field oucomes

> Appropriate calculations and the associated processes are demonstrated and the consequences of errors in Calculations are emphasized.
Make decisions solve problems.
Technology and science.
Personal development.
Information.

> Basic accounting/financial calculations are explained in relation to business and life situations.
Make decisions solve problems.
Technology and science .
Related systems.
Personal development.
Information.

> The skills in verbal and written communication are demonstrated and applied in workplace situations.
Make decisions solve problems.
Organisation teamwork.
Communication.
Related systems.
Personal development.
Information.

> The purpose of power tools and other installation equipment is explained and demonstrated.
Make decisions solve problems.
Organisation teamwork.
Make decisions solve problems.
Technology and science.

> Precautions required to ensure the safety of workers and others in the vicinity are explained and demonstrated in terms of the OSH Act.
Make decisions solve problems.
Organisation teamwork.
Communication.
Information.

> The responsibility of handling refrigerants (groups 1 and 2) and the consequences of unsafe procedures are explained.
Make decisions solve problems.
Technology and science .
Information.

> All system components are identified and their function explained in relation to the complete process.
Make decisions solve problems.
Technology and science .
Related systems.
Personal development.
Information.

> Typical operating temperature / pressure parameters are explained and evaluated.
Make decisions solve problems.
Technology and science .
Related systems.
Personal development.
Information.

> The nature of the electrical or mechanical fault is identified and analysed.
Make decisions solve problems.
Technology and science .
Related systems.
Personal development.
Information.

> The safety precautions that are to be practiced in the identification process are explained and demonstrated.
Organisation teamwork.
Communication.
Technology and science .
Related systems.
Personal development.
Information.

> The contribution to fault finding that refrigeration oil analysis makes is explained.
Make decisions solve problems.
Communication.
Technology and science .
Information.

> The use of drawing, diagrams and specifications as a means of conveying detail instructions is explained and the understanding of these media is demonstrated.
Make decisions solve problems.
Organisation teamwork.
Communication.
Technology and science .
Related systems.
Personal development.
Information.

> The ability to write a report as a communication method is demonstrated.
Organisation teamwork.
Communication.
Technology and science .
Related systems.
Personal development.
Information.

ASSOCIATED ASSESSMENT CRITERIA

1.
> Appropriate calculations and the associated processes are demonstrated and the consequences of errors in calculations are emphasized.
> Basic accounting/financial calculations are explained in relation to business and life situations.
> The skills in verbal and written communication are demonstrated and applied in workplace situations.

2.
> The purpose of power tools and other installation equipment is explained and demonstrated.

> Precautions required to ensure the safety of workers and others in the vicinity are explained and demonstrated in terms of the OSH Act.
> The responsibility of handling refrigerants (groups 1 and 2) and the consequences of unsafe procedures are explained.

3.
> All system components are identified and their function explained in relation to the complete process.
> Typical operating temperature / pressure parameters are explained and evaluated.

4.
> The nature of the electrical or mechanical fault is identified and analysed.
> The safety precautions that are to be practiced in the identification process are explained and demonstrated.
> The contribution to fault finding that refrigeration oil analysis makes is explained.

5.
> The use of drawing, diagrams and specifications as a means of conveying detail instructions is explained and the understanding of these media is demonstrated.
> The ability to write a report as a communication method is demonstrated.

6.
> The required personal skills are explained and demonstrated.
> The procedures or processes are explained in relation to the appropriate refrigeration system or component.
> The required installation methods or application are discussed and safety precautions noted.

Integrated assessment

Integrated assessment at the level of this qualification will evaluate the learner's capacity to integrate engineering principles, processes and behaviour across a range of workplace domains and thus be able to carry out maintenance, repair and installation work under supervision for the benefit of his employer.
Integrated assessment must specifically evaluate the learner's ability to:
> Understand and apply mathematics literacy, communicate and behave appropriately.
> Understand and use tools, instruments and equipment safely and purposefully.
> Understand and apply the engineering principles and safety considerations related to the specific workplace tasks and environment.
This will require assessment methodologies which will include demonstration, oral and written responses, both summative and formative, and evidence of these in the form of portfolios or projects. The learner must show sufficient evidence of ability to understand engineering principles and responsibility in workplace behaviour and procedures. Such ability may be obtained in a formal learnership, by practice gained in the workplace (RPL) or by a combination of formal learning and practice in the workplace. The assessment must also ensure that learners have achieved the critical outcomes.

INTERNATIONAL COMPARABILITY

There are no other countries in Sub-Saharan Africa which have established training organizations or formal qualifications in the sub-field of air conditioning, refrigeration and ventilation, comparison in the African context is therefore not possible.
A search was conducted on the Internet and the following qualifications were found:
> TPC Training Systems - USA - series 430 Air Conditioning and Refrigeration courses 431 - 439 and series 100 fundamentals courses 101 - 110
> Australian National Training Authority, Qualifications UTE 30999 Electrotechnology Refrigeration and Air Conditioning.
> New Zealand Qualifications Authority 2004 - Refrigeration and Air Conditioning levels 1 - 6

We are satisfied that our qualifications at NQF level 2 - 4 are comparable with the USA, Australian and New Zealand qualifications in terms of learning components. A direct comparison of level is not possible from the information available to us but feedback from training providers and resultant revisions to this issue of the qualifications has fine - tuned them to South African requirements.

It is noted that the fundamental component of this qualification is based on similar South African qualifications and no attempt has been made to compare this component with those of other countries.

ARTICULATION OPTIONS

Air conditioning, refrigeration and ventilation is a specialized industry embracing technical skills in mechanical, electrical and thermal engineering. Historically, skilled workers in this subfield have entered through:
> A formal apprenticeship in commercial or industrial refrigeration.
> An apprenticeship in the trade of millwright.
> An apprenticeship in the trade of electrician.
> Appropriate workplace learning in the required skills.
At NQF level 2 there would be commonality between the trades of millwright and electrician in exit level outcomes 1, 2 and 4, but trade specific training in exit level outcomes 3 and 5 would be required to achieve this qualification.
At NQF levels 3 and 4 there would be commonality in the fundamental and some core electrical learning components of air conditioning and refrigeration, electrical and millwright trades as learners would work in similar environments. The trade specific skills in the three trades would have little further commonality but are all engineering based. Skills programs of about 70 - 90 credits based on selective technical unit standards would be required to bring electricians or millwrights qualified at the required NQF level up to technical competence requirements for a qualification in air conditioning, refrigeration and ventilation.

MODERATION OPTIONS

Moderation of the assessment will be determined by the requirements of the MERSETA ETQA.
In addition moderators must have technical knowledge and experience of air conditioning, refrigeration and ventilation.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

Anyone assessing a learner against this qualification must be registered as an assessor with MERSETA ETQA or an ETQA that has a Memorandum of Understanding with the MERSETA ETQA.
Assessors should have a technical knowledge and experience of mechanical, electrical and thermal processes equivalent to one NQF level higher than this qualification. They should also have sufficient expertise to assess communication, mathematical literacy and life skills.

NOTES

This qualification replaces qualification 20720, "National Certificate: Air-Conditioning, Refregeration and Ventilation", Level 3, 173 credits.

Credits and learning components.

Fundamental components-36 credits
Core components-90 credits
Elective components-60 credits
Total-186 credits

Note:
> All credits are at NQF level 3 and the associated unit standards are shown in the titles matrix annexure.
> Certain rules of combination of elective credits are applicable, refer to the titles matrix annexure.

The assessment criteria for each unit standard are to be used by the assessor as the basis for assessment judgments, first in relation to each unit standard, and then in relation to integration at exit outcome level.

UNIT STANDARDS
(Note: A blank space after this line means that the qualification is not based on Unit Standards.)

	UNIT STANDARD ID AND TITLE	LEVEL	CREDITS	STATUS
Core	9329 Identify, use and maintain tools used in the air-conditioning, refrigeration and ventilation trades	Level 3	10	Registered
Core	9330 Fault-find a refrigeration plant stoppage or failure	Level 3	5	Registered
Core	9388 Explain the operation of the vapour compression refrigeration cycle, and identify and explain the operation of the components and the associated controls, safety devices and defrost systems	Level 3	14	Registered
Core	9390 Dismantle and assemble air-conditioning and refrigeration equipment	Level 3	6	Registered
Core	9396 Handle and place in position equipment used within the air-conditioning, refrigeration and ventilation industries	Level 3	4	Registered

Core	9397 Determine, define and evaluate operating parameters of a refrigeration system and transfer refrigerant	Level 3	5	Registered
Core	9529 Compile feasibility and commissioning reports	Level 3	3	Registered
Core	9530 Manage work time effectively	Level 3	3	Reregistered
Core	9535 Identify, handle and sample refrigeration oils for analysis, and demonstrate how oil can indicate the general condition of a refrigeration system	Level 3	3	Registered
Core	9540 Carry out elementary airflow measurements and calculations	Level 3	4	Registered
Core	9541 Maintain safety in the handling of hydrocarbon refrigerants	Level 3	12	Registered
Core	13374 Interpret air-conditioning, refrigeration and ventilation plant layout and component drawings, sketches and specifications	Level 3	6	Registered
Core	116223 Demonstrate knowledge of the OHS Act as it applies to employees in the air-conditioning, refrigeration and ventilation industries	Level 3	3	Draft - Prep for P Comment
Core	116463 Fault find, repair and maintain AC motors, circuitry and controls as applied to air conditioning, refrigeration and ventilation installations	Level 3	8	Draft - Prep for P Comment
Core	116464 Sketch and construct three-phase circuits as used in air-conditioning, refrigeration and ventilation installations	Level 3	8	Draft - Prep for P Comment
Core	116466 Inspect and maintain electrical control panels and circuitry as used for air-conditioning, refrigeration and ventilation installations	Level 3	6	Draft - Prep for P Comment
Elective	9393 Install and service power transmission systems for air-conditioning, refrigeration and ventilation equipment	Level 3	6	Registered
Elective	9394 Remove, install and service bearings used on air-conditioning, refrigeration and ventilation equipment	Level 3	6	Registered
Elective	9527 Lead a team, plan, allocate and assess their work	Level 3	4	Registered
Elective	9531 Show understanding of diversity in the workplace	Level 3	3	Registered
Elective	9532 Demonstrate basic knowledge of computers	Level 3	6	Registered
Elective	9533 Use communication skills to handle and resolve conflict in the workplace	Level 3	3	Registered
Elective	9534 Determine the properties of air from a psychometric chart and carry out basic calculation involving heat and mass transfer	Level 3	7	Registered
Elective	9536 Identify water piping systems, its components, accessories and controls used refrigeration and air conditioning installations	Level 3	4	Registered
Elective	9538 Identify and apply insulation methods and materials for piping and flat surfaces as applicable to air-conditioning and refrigeration systems	Level 3	6	Registered
Elective	9539 List the commonly applied air-conditioning systems, state their application and explain their operation	Level 3	8	Registered
Elective	9542 Maintain safety in the handling of ammonia refrigerant	Level 3	8	Registered
Elective	9543 Supply and fit air conditioners to vehicles	Level 3	6	Registered
Elective	9544 Check and maintain air-conditioners in vehicles	Level 3	4	Registered
Elective	9545 Diagnose and repair air-conditioners in vehicles	Level 3	4	Registered
Elective	9546 Install externally powered transport refrigeration systems	Level 3	6	Registered
Elective	13378 Operate water treatment systems used in air-conditioning and refrigeration installations	Level 3	3	Registered
Elective	13394 Install eutectic and multi-compartment transport refrigeration systems	Level 3	10	Registered
Elective	114946 Identify causes of stress and techniques to manage it in the workplace	Level 3	2	Registered
Elective	116465 Identify and commission modulating control systems as used in air conditioning and refrigeration systems	Level 3	6	Draft - Prep for P Comment
Elective	116468 Adhere to the legal requirements of SANS 10147 (SABS 0147) standards when handling group 1 refrigerants	Level 3	6	Draft - Prep for P Comment
Fundamental	7456 Use mathematics to investigate and monitor the financial aspects of personal, business and national issues	Level 3	2	Registered
Fundamental	8968 Accommodate audience and context needs in oral communication	Level 3	5	Registered
Fundamental	8969 Interpret and use information from texts	Level 3	5	Registered
Fundamental	8970 Write texts for a range of communicative contexts	Level 3	5	Registered
Fundamental	8973 Use language and communication in occupational learning programmes	Level 3	5	Registered
Fundamental	9010 Demonstrate an understanding of the use of different number bases and measurement units and an awareness of error in the context of relevant calculations	Level 3	2	Registered
Fundamental	9012 Investigate life and work related problems using data and probabilities	Level 3	5	Registered
Fundamental	9013 Describe, apply, analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts	Level 3	4	Registered

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:

Further Education and Training Certificate: Air-conditioning, Refrigeration and Ventilation

SAQA QUAL ID	*QUALIFICATION TITLE*	
48966	Further Education and Training Certificate: Air-conditioning, Refrigeration and Ventilation	
SGB NAME	SGB Air-conditioning Refrigeration and Ventilation	
ABET BAND	*PROVIDER NAME*	
Undefined		
QUALIFICATION CODE	*QUAL TYPE*	*SUBFIELD*
MET-4-National Certificate	National Certificate	Manufacturing and Assembly
MINIMUM CREDITS	*NQF LEVEL*	*QUALIFICATION CLASS*
169	Level 4	Regular-Unit Stds Based
SAQA DECISION NUMBER	*REGISTRATION START DATE*	*REGISTRATION END DATE*

PURPOSE OF THE QUALIFICATION

The air conditioning, refrigeration and ventilation industry provides a service to many sectors of he country's economy such as food processing and warehousing; food transportation, distribution and retailing; deep level mining and industrial process; high rise and retail property; specialized medical care; automotive and mass transport; tourism and hospitality.
This qualification provides the learner with the skills required to service, repair, commission and operate mechanical / electrical equipment and systems in the air conditioning, refrigeration and ventilation sub-field in a variety of applications, and to supervise work teams.

The current rate of urban development, the advance in technology and development of tourism creates an ever-increasing demand for air conditioning, refrigeration and ventilation equipment and systems and therefore a corresponding demand for technicians to repair, maintain, install and manufacture such equipment and systems.
The technical skills required for this purpose are scarce and there is a growing demand for technicians skilled in the mechanical, electrical and thermal sciences. These qualifications are ideally suited to school-leavers (male and female) who have an interest in the engineering sciences and have practical skills. This series of qualifications also equips the learner with entrepreneurial skills which would lead to self employment in the SMME field (Most businesses in the field of air conditioning, refrigeration, and ventilation are in fact SMME's).

South Africa is the only country in Sub-Saharan Africa which has established qualifications and a network of training providers countrywide. South African trained technicians are the obvious choice for work in this field in all African countries north of our borders. We also see an untapped potential for training of learners from NEPAD countries which would assist in the further development of our training resources.

This qualification specifically suits learners who have an interest in science and mathematics as well as manual dexterity (ability to use tools) and a consciousness of personal and environmental safety. It is also suitable for workers who have had advanced practical and technical experience working in the air conditioning, refrigeration and ventilation industry but lack the formal learning required in the qualification and who have a level to competence equivalent of the NQF level 3 qualification in air conditioning, refrigeration and ventilation as determined in formal assessment by an assessor who meets the criteria for the registration of assessors.

To achieve competence in this qualification the learner must be able to:
> Apply mathematical literacy skills to carry out the required calculations at this level related to the work process and financial skills to understand personal, business and national issues.
> Apply oral and written methods to communicate effectively with others at all levels in workplace and technical matters.
> Be able to give instructions, read and understand drawings and diagrams related to his work.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:

Further Education and Training Certificate: Air-conditioning, Refrigeration and Ventilation

SAQA QUAL ID	*QUALIFICATION TITLE*	
48966	Further Education and Training Certificate: Air-conditioning, Refrigeration and Ventilation	
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MET-4-National Certificate	National Certificate	Manufacturing and Assembly
MINIMUM CREDITS	*NQF LEVEL*	*QUALIFICATION CLASS*
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To achieve competence in this qualification the learner must be able to:
> Apply mathematical literacy skills to carry out the required calculations at this level related to the work process and financial skills to understand personal, business and national issues.
> Apply oral and written methods to communicate effectively with others at all levels in workplace and technical matters.
> Be able to give instructions, read and understand drawings and diagrams related to his work.

> Be able to supervise the use of power tools, equipment and instruments by work teams, accurately and safely.
> Have a thorough knowledge of the OSH Act and safety considerations relating to all aspects of the work environment.
> Understand the operation of vapour compression refrigeration systems, and their electrical and control systems and be able to select components for such systems.
> Understand and apply quality control systems in the workplace.
> Have knowledge of the systems and processes that he has elected to include in his learning program.

Rationale of the qualification

Air conditioning, refrigeration and ventilation are subfields of specialized engineering which account for the design, manufacture, installation, maintenance, and repair of systems which provide artificial cooling for the environment and the processing and preservation of foodstuffs. The development of the urban lifestyle with its concentration of population into centralized areas, the food chain from producer to consumer as well as the working environment and medical care would not be possible without these specialized engineering services.

This is the third qualification in a series of qualifications which will lead to a learner acquiring all the skills required to work in the industry in the repair, maintenance, installation, manufacture and ultimately design of the mechanical / electrical systems which provide temperature control for environmental or process needs. By qualifying at this level a learner will achieve the status of a technician in air conditioning, refrigeration and ventilation and will have an advanced knowledge of systems and equipment and be able to supervise working teams.

> Learner mechanic - Level 2, Credits 145 - (Technical competence - Has a basic understanding of equipment and is able to carry out technical work under supervision.)
> Refrigeration Mechanic / Journeyman - Level 3, - (Technical competence - Has a knowledge of equipment and systems and is able to carry out technical work without supervision.
> Technician - Level 4, - (Technical competence - Has an advanced knowledge of systems and equipment and is able to supervise technical work.)
> Senior Technician / Project Leader - Level 5, - (Has a knowledge of system design, selection and engineering and has management skills.

The learner will be required to reach competence in the advanced skills of the servicing repair and commissioning of systems and the selection of components and to understand and operate supervisory control systems. He will be required to supervise work teams and communicate at all levels in the workplace and with customers.
There are many applications of air conditioning, refrigeration and ventilation which relate directly to the tourism and hospitality industry:
> Air conditioning of hotels, restaurants and recreation areas.
> Air conditioning of luxury buses, automobiles and other transport modes.
> Refrigeration related to the food chain (producers, processors, warehouses, transport, retailing).
The 2010 events and subsequent increase in level of tourism will create further demand for the services of trained technicians to install, service and repair cooling equipment at all skills levels.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

This qualification assumes that the candidate has already achieved the following:
> National Certificate in Air conditioning, Refrigeration and Ventilation at NQF level 3 (NLRD 20720)
> FETC (Further Education and Training Certificate), has an interest in science and technology and some practical ability in the use on tools.

Recognition of prior learning
Whether a candidate attends formal courses or acquires the required skills through informal means, the same standards apply as per the matrix of unit standards. The qualification and the standards have been written in such a way that the learning has to be assessed in an integrated way. Assessors will assess evidence to establish what the learners know and can do. Such evidence may be gathered through course related activities and / or through work related activities. In cases where candidates do not attend formal courses, assessors should seek work related evidence as far as possible.
Where courses are provided for learners, institutions can use the unit standards and this qualification to assess learning achievements.

For candidates who are not able to achieve the outcomes, providers can then use the standards and qualifications to determine a specific learning program to suit the candidates learning needs.

QUALIFICATION RULES

N/A

EXIT LEVEL OUTCOMES

1. The exit level outcomes should be read in the context of NQF level 4. Range statements are specified in the relevant unit standards.

2. Demonstrate the ability to service, repair and start-up air conditioning, refrigeration and ventilation systems.

3. Explain the need for control of quality in the manufacturing, installation, maintenance and repair processes relating to air conditioning, refrigeration and ventilation.

4. Explain the operation of the various control devices, control systems and programmable logic systems used in air conditioning, refrigeration and ventilation plants.

5. Explain the operation of a range of refrigeration systems and their application in industry.

6. Explain and use the elective skills which are selected.

The following indicates the critical cross-field outcomes relative to the exit level outcomes of the qualification:

1. Appropriate calculations and the associated processes are undertaken and explained.
Relative to the following critical cross-field outcomes:
> Make decisions solve problems
> Technology and science
> Related systems
> Personal development
> Information

2. Accounting/financial calculations are undertaken and explained in terms of business, personal and national context.
Relative to the following critical cross-field outcomes:
> Make decisions solve problems
> Technology and science
> Related systems
> Personal development
> Information

3. Skills in verbal and written communication at all levels are demonstrated and their need is explained.
Relative to the following critical cross-field outcomes:
> Make decisions solve problems
> Organisation Teamwork
> Communication
> Personal development
> Information

4. The procedures and sequences to carry out the work are identified and discussed.
Relative to the following critical cross-field outcomes:
> Make decisions solve problems
> Organisation Teamwork
> Communication
> Technology and science
> Related systems
> Information

5. The safety considerations of the work team and others in the vicinity are discussed in terms of the OSH Act and practical safety.
Relative to the following critical cross-field outcomes:
> Make decisions solve problems
> Organisation Teamwork

> Communication
> Related systems
> Information

6. The consequences of defective material and assembly are explained in terms of safety, legal and contractual considerations.
Relative to the following critical cross-field outcomes:
> Make decisions solve problems
> Communication
> Technology and science
> Related systems
> Personal development
> Information

7. The standards for control of quality are explained and their application is discussed.
Relative to the following critical cross-field outcomes:
> Communication
> Technology and science
> Related systems
> Personal development
> Information

8. The need for control devices and systems is explained.
Relative to the following critical cross-field outcomes:
> Technology and science
> Related systems
> Information

9. The functioning of the devices and systems are explained by means of control and wiring diagrams.
Relative to the following critical cross-field outcomes:
> Technology and science
> Related systems
> Personal development
> Information

10. The operation of different systems and refrigerants is explained and reasons for their selection is given.
Relative to the following critical cross-field outcomes:
> Make decisions solve problems
> Technology and science
> Related systems
> Personal development
> Information

The need for ancilliary systems such as water treatment are discussed and explained.
Relative to the following critical cross-field outcomes:
> Make decisions solve problems
> Technology and science
> Related systems
> Personal development
> Information

ASSOCIATED ASSESSMENT CRITERIA

1.
> Appropriate calculations and the associated processes are undertaken and explained.
> Accounting/financial calculations are undertaken and explained in terms of business, personal and national context.
> Skills in verbal and written communication at all levels are demonstrated and their need is explained.

2.
> The procedures and sequences to carry out the work are identified and discussed.
> The safety considerations of the work team and others in the vicinity are discussed in terms of the OSH Act and practical safety.

3.

> The consequences of defective material and assembly are explained in terms of safety, legal and contractual considerations.
> The standards for control of quality are explained and their application is discussed.

4.
> The functioning of the devices and systems are explained by means of control and wiring diagrams.
> The need for control devices and systems is explained.

5.
> The operation of different systems and refrigerants is explained and reasons for their selection is given.
> The need for ancilliary systems such as water treatment are discussed and explained.

6.
> The required personal skills are explained and demonstrated.
> The procedures or processes are explained in relation to the appropriate refrigeration system or component.
> The required installation methods or application are discussed and safety precautions noted.

Integrated assessment
Integrated assessment at the level of this qualification will evaluate the learner's capacity to integrate engineering principles, processes and behaviour across a range of workplace domains and thus be able to carry out maintenance, repair and installation work under supervision for the benefit of his employer.
Integrated assessment must specifically evaluate the learner's ability to:
> Understand and apply mathematics literacy, communicate and behave appropriately.
> Understand and use tools, instruments and equipment safely and purposefully.
> Understand and apply the engineering principles and safety considerations related to the specific workplace tasks and environment.
This will require assessment methodologies which will include demonstration, oral and written responses, both summative and formative, and evidence of these in the form of portfolios or projects. Since this is a basic qualification, the learner must show sufficient evidence of ability to understand engineering principles and workplace behaviour and procedures. Such ability may be obtained in a formal learnership, by practice gained in the workplace (RPL) or by a combination of formal learning and practice in the workplace. The assessment must also ensure that learners have achieved the critical outcomes.

INTERNATIONAL COMPARABILITY

There are no other countries in Sub-Saharan Africa which have established training organizations or formal qualifications, comparison in the African context is therefore not possible.
A search was conducted on the Internet and the following qualifications were found:
> TPC Training Systems - USA - series 430 Air Conditioning and Refrigeration courses 431 - 439 and series 100 fundamentals courses 101 - 110
> Australian National Training Authority, Qualifications UTE 30999 Electrotechnology Refrigeration and Air Conditioning.
> New Zealand Qualifications Authority 2004 - Refrigeration and Air Conditioning levels 1 - 6

We are satisfied that our qualifications at NQF level 2 - 4 are comparable with the USA, Australian and New Zealand qualifications in terms of learning components. A direct comparison of level is not possible from the information available to us but feedback from training providers and resultant revisions to this issue of the qualifications has fine - tuned them to South African requirements.

It is noted that the fundamental component of this qualification is based on similar South African qualifications and no attempt has been made to compare this component with those of other countries.

ARTICULATION OPTIONS

Air conditioning, refrigeration and ventilation is a specialized industry embracing technical skills in mechanical, electrical and thermal engineering. Historically, skilled workers in this subfield have entered through:
> A formal apprenticeship in commercial or industrial refrigeration.
> An apprenticeship in the trade of millwright.
> An apprenticeship in the trade of electrician.
> Appropriate workplace learning in the required skills.
At NQF level 2 there would be commonality between the trades of millwright and electrician in exit level outcomes 1, 2 and 4, but trade specific training in exit level outcomes 3 and 5 would be required to achieve this qualification.

At NQF levels 3 and 4 there would be commonality in the fundamental and some core electrical learning components of air conditioning and refrigeration, electrical and millwright trades as learners would work in similar environments. The trade specific skills in the three trades would have little further commonality but are all engineering based. Skills programs of about 70 - 90 credits based on selective technical unit standards would be required to bring electricians or millwrights qualified at the required NQF level up to competence requirements for a qualification in air conditioning, refrigeration and ventilation.

MODERATION OPTIONS

Moderation of the assessment will be determined by the requirements of the relevant ETQA.
In addition moderators must have technical knowledge and experience of air conditioning, refrigeration and ventilation.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

Anyone assessing a learner against this qualification must be registered as an assessor with relevant ETQA or an ETQA that has a Memorandum of Understanding with the relevant ETQA.
Assessors should have a technical knowledge and experience of mechanical, electrical and thermal processes equivalent to one NQF level higher than this qualification. They should also have sufficient expertise to assess communication, mathematical literacy and life skills.

NOTES

This qualification replaces qualification 20721, which is "National Certificate in Air Conditioning, Refrigeration and Ventilation", Level 4, 135 credits.

The assessment criteria for each unit standard are to be used by the assessor as the basis for assessment judgments, first in relation to each unit standard, and then in relation to integration at exit outcome level.

UNIT STANDARDS
(Note: A blank space after this line means that the qualification is not based on Unit Standards.)

	UNIT STANDARD ID AND TITLE	LEVEL	CREDITS	STATUS
Core	116377 Explain the need for water treatment and the methods and equipment used	Level 4	4	Draft - Prep for P Comment
Core	116379 Demonstrate knowledge of the OHS Act applicable to technicians employed in the air-conditioning, refrigeration and ventilation industries	Level 4	4	Draft - Prep for P Comment
Core	116389 Write a technical report	Level 4	4	Draft - Prep for P Comment
Core	116392 Understand, implement, maintain and monitor general quality standards within the air-conditioning, refrigeration and ventilation industries	Level 4	8	Draft - Prep for P Comment
Core	116403 Service a refrigeration system and set it in operation	Level 4	8	Draft - Prep for P Comment
Core	116408 List, define and discuss the characteristics of commonly used refrigerants used in the refrigeration industry	Level 4	4	Draft - Prep for P Comment
Core	116418 Explain function and operation of refrigeration circuits as applied to air-conditioning or refrigeration systems and select and explain the function of components, accessories and controls	Level 4	8	Draft - Prep for P Comment
Core	116421 Repair and overhaul air-conditioning, refrigeration and ventilation equipment	Level 4	8	Draft - Prep for P Comment
Core	116458 Select control systems and instruments for air conditioning, refrigeration and ventilation plants, determine control parameters and draw control sequence and electrical wiring diagrams	Level 4	7	Draft - Prep for P Comment
Core	116460 Demonstrate an understanding of logic controllers as used in air conditioning, refrigeration and ventilation applications	Level 4	7	Draft - Prep for P Comment
Core	116461 Understand basic electrical and mechanical engineering principles as applicable to air conditioning, refrigeration and ventilation	Level 4	9	Draft - Prep for P Comment
Elective	116375 Commission air-conditioning and ventilation systems	Level 4	8	Draft - Prep for P Comment
Elective	116380 Supervise workers at levels 2 and 3	Level 4	6	Draft - Prep for P Comment
Elective	116396 Commission and maintain transport refrigeration systems	Level 4	8	Draft - Prep for P Comment
Elective	116397 Determine if refrigeration plants operating with a group 1 refrigerant conform to the regulations in SANS 10147	Level 4	8	Draft - Prep for P Comment

2004/08/27 ***Qual ID:*** 48966 SAQA: NLRD Report "Qualification Detail"

Elective	116406	Diagnose operational faults in refrigeration systems and take remedial action or propose corrective action	Level 4	6	Draft - Prep for P Comment
Elective	116411	Plot air-conditioning processes on the psychrometric chart and determine plant operating parameters	Level 4	7	Draft - Prep for P Comment
Elective	116413	Monitor an air-conditioning, refrigeration or ventilation system through the building management system	Level 4	8	Draft - Prep for P Comment
Elective	116415	Commission refrigeration systems	Level 4	8	Draft - Prep for P Comment
Fundamental	8974	Engage in sustained oral communication and evaluate spoken texts	Level 4	5	Registered
Fundamental	8975	Read analyse and respond to a variety of texts	Level 4	5	Registered
Fundamental	8976	Write for a wide range of contexts	Level 4	5	Registered
Fundamental	8979	Use language and communication in occupational learning programmes	Level 4	5	Registered
Fundamental	9015	Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life related problems	Level 4	5	Registered
Fundamental	9016	Represent analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts	Level 4	4	Registered

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 1

Behave in the proper manner under working conditions

SAQA US ID	*UNIT STANDARD TITLE*
116246	Behave in the proper manner under working conditions

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Understand workplace ethics in the air-conditioning, refrigeration and ventilation industry.

SPECIFIC OUTCOME 2

Identify and describe the characteristics of a successful worker in the air conditioning, refrigerat

SPECIFIC OUTCOME 3

Discuss workplace ethics in the air-conditioning, refrigeration and ventilation industry and link it

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 2

Clean air-conditioning, refrigeration and ventilation plants, components and work sites

SAQA US ID	*UNIT STANDARD TITLE*
116238	Clean air-conditioning, refrigeration and ventilation plants, components and work sites

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Plan and prepare to clean plant, equipment, components or work site.

SPECIFIC OUTCOME 2

Clean air conditioners.

SPECIFIC OUTCOME 3

Clean equipment and/or components.

SPECIFIC OUTCOME 4

Clean filters.

SPECIFIC OUTCOME 5

Clean work sites.

SPECIFIC OUTCOME 6

Complete the cleaning process and report.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 3

Define and explain the principles of thermodynamics and carry out basic calculations involving heat

SAQA US ID	*UNIT STANDARD TITLE*
116236	Define and explain the principles of thermodynamics and carry out basic calculations involving heat

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	5

Specific Outcomes:

SPECIFIC OUTCOME 1

Define and explain the relationship between force, work, power and energy.

SPECIFIC OUTCOME 2

Define temperature and heat and explain the different forms of heat.

SPECIFIC OUTCOME 3

Define pressure and explain the different pressures.

SPECIFIC OUTCOME 4

Define and explain the terms density, specific volume, airflow and mass flow.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 4

Demonstrate understanding of fundamentals of electricity and its application in air conditioning, refrigeration and ventilation equipment

SAQA US ID	*UNIT STANDARD TITLE*
116232	Demonstrate understanding of fundamentals of electricity and its application in air conditioning, refrigeration and ventilation equipment

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Demonstrate an understanding of the fundamentals of electricity.

SPECIFIC OUTCOME 2

Define conductors and insulators.

SPECIFIC OUTCOME 3

Define and apply Ohm's law.

SPECIFIC OUTCOME 4

Define and apply circuit protection for single-phase and three-phase circuits.

SPECIFIC OUTCOME 5

List the potential hazards and the methods to prevent injury when using electricity.

SPECIFIC OUTCOME 6

List and explain the common faults that can occur in electrical circuits.

SPECIFIC OUTCOME 7

Differentiate between permanent and temporary magnets.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 5

Explain the operation of basic vapour compression refrigeration systems, and identify and explain the function of the components and accessories as well as their retrieval and storage procedures

SAQA US ID	*UNIT STANDARD TITLE*
116224	Explain the operation of basic vapour compression refrigeration systems, and identify and explain the function of the components and accessories as well as their retrieval and storage procedures

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Explain, with the aid of a block diagram, the operation of the vapour compression refrigeration syst

SPECIFIC OUTCOME 2

Name and indicate the components and pipes in the block diagrams drawn and indicate the direction of

SPECIFIC OUTCOME 3

Explain the process taking place in each component.

SPECIFIC OUTCOME 4

Discuss the relationship between the pressure and the temperature of a refrigerant.

SPECIFIC OUTCOME 5

Identify and explain the function of components and accessories of a refrigeration system.

SPECIFIC OUTCOME 6

Handle and store refrigeration system components and accessories.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 6

Handle refrigerant containers and transfer refrigerants into service cylinders

SAQA US ID	*UNIT STANDARD TITLE*
116355	Handle refrigerant containers and transfer refrigerants into service cylinders

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	3

Specific Outcomes:

SPECIFIC OUTCOME 1

List and discuss the hazards when handling refrigerants and containers.

SPECIFIC OUTCOME 2

Identify and inspect refrigerant containers.

SPECIFIC OUTCOME 3

Prepare containers for refrigerant transfer.

SPECIFIC OUTCOME 4

Transfer refrigerant into empty, evacuated container.

SPECIFIC OUTCOME 5

Demonstrate the handling and storing of refrigerant containers without endangering self, others, or

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 7

Identify and apply fixing methods for piping, ducting and equipment used in the trade of air-conditioning, refrigeration and ventilation

SAQA US ID	*UNIT STANDARD TITLE*
116234	Identify and apply fixing methods for piping, ducting and equipment used in the trade of air-conditioning, refrigeration and ventilation

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Identify and state the purpose of various fixing methods.

SPECIFIC OUTCOME 2

Identify and state the purpose of keys and mechanical locking devices.

SPECIFIC OUTCOME 3

Identify and state the purpose, advantages and disadvantages of various bracketing systems used for

SPECIFIC OUTCOME 4

Apply fixing methods.

SPECIFIC OUTCOME 5

Apply keys and locking devices.

SPECIFIC OUTCOME 6

Apply bracketing systems.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 8

Identify and set ON-OFF control devices as used in air conditioning and refrigeration systems, explain their operation and discuss their application and fault finding

SAQA US ID	*UNIT STANDARD TITLE*
116226	Identify and set ON-OFF control devices as used in air conditioning and refrigeration systems, explain their operation and discuss their application and fault finding

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Define the terms used to describe an ON-OFF control system and its functions.

SPECIFIC OUTCOME 2

State and describe the commonly used control systems based on their energy source.

SPECIFIC OUTCOME 3

State and describe the three types of control devices used on air conditioning and refrigeration sys

SPECIFIC OUTCOME 4

State and describe the commonly used types of measuring elements and sensors.

SPECIFIC OUTCOME 5

Connect and commission ON-OFF control devices.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 9

Identify and state application of belt drives, couplings,gearboxes and bearings used on air-conditioning, refrigeration and ventilation plants and recognize misaligned, mismatched and worn components

SAQA US ID	*UNIT STANDARD TITLE*
116233	Identify and state application of belt drives, couplings,gearboxes and bearings used on air-conditioning, refrigeration and ventilation plants and recognize misaligned, mismatched and worn components

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Identify gearboxes, couplings and belts.

SPECIFIC OUTCOME 2

Identify faulty couplings, belts and drives.

SPECIFIC OUTCOME 3

State the typical applications of belt drives, couplings and gearboxes.

SPECIFIC OUTCOME 4

State and explain the consequences of belts mismatched for length, for type and for pulley.

SPECIFIC OUTCOME 5

State the consequences of misaligned belt drives and couplings and of wrongly tensioned belts.

SPECIFIC OUTCOME 6

Identify and state typical application of various types of bearings.

SPECIFIC OUTCOME 7

Explain the different methods of lubricating bearings.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 10

Identify materials, piping, fitting, jointing methods and insulation materials used for air-conditioning and refrigeration installations

SAQA US ID	*UNIT STANDARD TITLE*
116230	Identify materials, piping, fitting, jointing methods and insulation materials used for air-conditioning and refrigeration installations

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	4

Specific Outcomes:

SPECIFIC OUTCOME 1

List, identify and state the application of various materials used for refrigeration and air-conditi

SPECIFIC OUTCOME 2

Identify and state application of various types and sizes of piping.

SPECIFIC OUTCOME 3

Identify and state purpose of various pipefittings.

SPECIFIC OUTCOME 4

Identify and state purpose of various pipe-jointing methods.

SPECIFIC OUTCOME 5

Identify and state purpose of insulation materials used in refrigeration and air-conditioning instal

SPECIFIC OUTCOME 6

Identify and state the purpose and applications of pipe support and securing fittings.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 11

Identify refrigerant containers, explain handling procedures and discuss the use of refrigerants

SAQA US ID	*UNIT STANDARD TITLE*
116334	Identify refrigerant containers, explain handling procedures and discuss the use of refrigerants

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	3

Specific Outcomes:

SPECIFIC OUTCOME 1

Name and identify the type of refrigerants in containers and systems.

SPECIFIC OUTCOME 2

Demonstrate and/or explain the handling and storing of refrigerant containers without endangering se

SPECIFIC OUTCOME 3

Discuss the use of refrigerants in cooling systems.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 12

Identify, use and maintain hand tools and measuring instruments used in the air-conditioning, refrigeration and ventilation trades

SAQA US ID	*UNIT STANDARD TITLE*
116239	Identify, use and maintain hand tools and measuring instruments used in the air-conditioning, refrigeration and ventilation trades

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	12

Specific Outcomes:

SPECIFIC OUTCOME 1

Identify and state the purpose of hand tools used in the air-conditioning, refrigeration and ventila

SPECIFIC OUTCOME 2

Demonstrate the use and maintenance of hand tools used in the air-conditioning, refrigeration and ve

SPECIFIC OUTCOME 3

Identify and state the purpose of measuring instruments used in the air-conditioning, refrigeration

SPECIFIC OUTCOME 4

Demonstrate the use of measuring instruments used in the air-conditioning, refrigeration and ventila

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 13

Identify, use and maintain refrigeration trade specific tools and instruments

SAQA US ID	*UNIT STANDARD TITLE*
116335	Identify, use and maintain refrigeration trade specific tools and instruments

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Identify the tools/instruments used in the refrigeration trade.

SPECIFIC OUTCOME 2

Maintain refrigeration tools/instruments.

SPECIFIC OUTCOME 3

Prepare for use each of the tools/instruments used in the refrigeration trade.

SPECIFIC OUTCOME 4

Use refrigeration trade tools/instruments.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 14

Install self contained diesel/electric refrigeration units

SAQA US ID	*UNIT STANDARD TITLE*
116242	Install self contained diesel/electric refrigeration units

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Engineering and Related Design

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-ENG-0-SGB ARV	Regular	Level 2	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Prepare to install the equipment.

SPECIFIC OUTCOME 2

Install the unit.

SPECIFIC OUTCOME 3

Connect the unit and check operation.

SPECIFIC OUTCOME 4

Carry out post-installation work.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 15

Install, connect and maintain electrical cables and conductors as applied in air conditioning, refrigeration and ventilation installations

SAQA US ID	*UNIT STANDARD TITLE*
116243	Install, connect and maintain electrical cables and conductors as applied in air conditioning, refrigeration and ventilation installations

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Prepare to install and terminate cables and conductors.

SPECIFIC OUTCOME 2

Prepare to install electrical cables, conductors and wire ways.

SPECIFIC OUTCOME 3

Install electrical cables, conductors and/or wire ways.

SPECIFIC OUTCOME 4

Terminate and connect cables and conductors.

SPECIFIC OUTCOME 5

Complete work task.

SPECIFIC OUTCOME 6

Maintain electrical cables, conductors and wire ways.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 16

Perform basic arc welding of metals as applicable to air-conditioning, refrigeration and ventilation installations

SAQA US ID	*UNIT STANDARD TITLE*
116245	Perform basic arc welding of metals as applicable to air-conditioning, refrigeration and ventilation installations

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Prepare to arc weld metals.

SPECIFIC OUTCOME 2

Arc-weld metals.

SPECIFIC OUTCOME 3

Apply quality checks on completed weld and correct if necessary.

SPECIFIC OUTCOME 4

Perform finishing activities.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 17

Sketch and construct electrical circuits applicable to single-phase air conditioning, refrigeration and ventilation installations

SAQA US ID	*UNIT STANDARD TITLE*
116244	Sketch and construct electrical circuits applicable to single-phase air conditioning, refrigeration and ventilation installations

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 2	9

Specific Outcomes:

SPECIFIC OUTCOME 1

Identify switches, components and loads.

SPECIFIC OUTCOME 2

Sketch and interpret basic single-phase circuit diagrams.

SPECIFIC OUTCOME 3

Construct single-phase circuits.

SPECIFIC OUTCOME 4

Complete the task.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 18

Work Safely and use safety equipment when carrying out mechanical or electrical work on air conditioning, refrigeration and ventilation installations

SAQA US ID	UNIT STANDARD TITLE
116241	Work Safely and use safety equipment when carrying out mechanical or electrical work on air conditioning, refrigeration and ventilation installations

SGB NAME	ABET BAND	PROVIDER NAME
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	SUBFIELD DESCRIPTION
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
MET-MNA-0-SGB ARV	Regular	Level 2	7

Specific Outcomes:

SPECIFIC OUTCOME 1

Interpret and adhere to safety signs, regulations and procedures related to a working environment.

SPECIFIC OUTCOME 2

Care for safety equipment.

SPECIFIC OUTCOME 3

Check tools, equipment and site for safety.

SPECIFIC OUTCOME 4

Adhere to appropriate safety procedures before, during and after job processes.

SPECIFIC OUTCOME 5

Report and record unsafe conditions or working practices in accordance with work site procedures, st

SPECIFIC OUTCOME 6

Take action or describe action to be taken in case of an electrical accident.

SPECIFIC OUTCOME 7

Leave the job site safely.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 19

Adhere to the legal requirements of SANS 10147 (SABS 0147) standards when handling group 1 refrigerants

SAQA US ID	*UNIT STANDARD TITLE*
116468	Adhere to the legal requirements of SANS 10147 (SABS 0147) standards when handling group 1 refrigerants

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Briefly describe the objectives of SANS 10147 (SABS 0147).

SPECIFIC OUTCOME 2

Define the applicable terms used in SANS 10147 (SABS 0147) and state the requirements for personal p

SPECIFIC OUTCOME 3

List and discuss the regulations regarding machinery areas, plant rooms and cold rooms.

SPECIFIC OUTCOME 4

List and discuss the requirements regarding the operation, maintenance and the provision for servici

SPECIFIC OUTCOME 5

List and discus the regulations regarding charging, discharging or substituting refrigerants.

SPECIFIC OUTCOME 6

List and discuss the regulations regarding field tests on refrigerating systems.

SPECIFIC OUTCOME 7

State the duty a person has to report cases where an installation does not comply with the requireme

SPECIFIC OUTCOME 8

Generate a report on an installation subject to SANS 10147 (SABS 0147) and using a group 1 refrigera

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 20

Carry out elementary airflow measurements and calculations

SAQA US ID	*UNIT STANDARD TITLE*
116698	Carry out elementary airflow measurements and calculations

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-ENG-0-SGB ARV	Regular	Level 3	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Carry out calculations involving sizes and areas of square and round ducts.

SPECIFIC OUTCOME 2

Carry out elementary airflow calculations.

SPECIFIC OUTCOME 3

Prepare for measuring the air pressure in a duct.

SPECIFIC OUTCOME 4

Measure air pressures in a duct.

SPECIFIC OUTCOME 5

Evaluate results.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 21

Check and maintain air-conditioners in vehicles

SAQA US ID	*UNIT STANDARD TITLE*
116703	Check and maintain air-conditioners in vehicles

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Conduct visual and maintenance checks.

SPECIFIC OUTCOME 2

Conduct physical checks.

SPECIFIC OUTCOME 3

Conduct mechanical checks.

SPECIFIC OUTCOME 4

Make final diagnosis.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 22

Complete feasibility and commissioning reports

SAQA US ID	*UNIT STANDARD TITLE*
12488	Complete feasibility and commissioning reports

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-3-SGB ARV	Regular	Level 3	3

Specific Outcomes:

SPECIFIC OUTCOME 1

Demonstrate an understanding of the basic concepts used in the workplace when generating reports.

SPECIFIC OUTCOME 2

Identify three different types of reports required in the work-environment and the type of informati

SPECIFIC OUTCOME 3

Arrange information in such a way that the report is logical, easy to understand and applicable for

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 23

Demonstrate knowledge of the OHS Act as it affects experienced workers in the air conditioning, refrigeration and ventilation industries

SAQA US ID	*UNIT STANDARD TITLE*
116719	Demonstrate knowledge of the OHS Act as it affects experienced workers in the air conditioning, refrigeration and ventilation industries

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	3

Specific Outcomes:

SPECIFIC OUTCOME 1

Demonstrate understanding of section 9 of the OHS ACT.

SPECIFIC OUTCOME 2

Demonstrate understanding of section 15 of the OHS ACT.

SPECIFIC OUTCOME 3

Demonstrate understanding of section 24 of the OHS ACT.

SPECIFIC OUTCOME 4

Demonstrate understanding of the applicable sections of the "general safety regulations".

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 24

Demonstrate knowledge of the OHS Act as it applies to employees in the air-conditioning, refrigeration and ventilation industries

SAQA US ID	*UNIT STANDARD TITLE*
116223	Demonstrate knowledge of the OHS Act as it applies to employees in the air-conditioning, refrigeration and ventilation industries

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-ENG-0-SGB ARV	Regular	Level 3	3

Specific Outcomes:

SPECIFIC OUTCOME 1

State the objectives of the OSH Act and explain the definitions.

SPECIFIC OUTCOME 2

Demonstrate understanding of section 8 of the Occupational Health and Safety Act.

SPECIFIC OUTCOME 3

Demonstrate understanding of section 13 of the Occupational Health and Safety Act.

SPECIFIC OUTCOME 4

Demonstrate understanding of section 14 of the Occupational Health and Safety Act.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 25

Determine the properties of air from a psychrometric chart and carry out basic calculation involving heat and mass transfer

SAQA US ID	*UNIT STANDARD TITLE*
116695	Determine the properties of air from a psychrometric chart and carry out basic calculation involving heat and mass transfer

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	7

Specific Outcomes:

SPECIFIC OUTCOME 1

Define "Psychrometrics", name and define the properties of air and plot an air condition on the psyc

SPECIFIC OUTCOME 2

Calculate the amount of sensible heat (in kilowatt) added to or removed from the air by means of the

SPECIFIC OUTCOME 3

Calculate the amount of sensible heat and latent heat and the total heat removed (in kilowatt) add

SPECIFIC OUTCOME 4

Calculate the amount of moisture added to or removed from the air.

SPECIFIC OUTCOME 5

Calculate the amount of chilled water required for a cooling or heating application.

SPECIFIC OUTCOME 6

Calculate the amount of heat (in kilowatt) required to produce saturated steam.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 26

Determine, define and evaluate operating parameters of a refrigeration system

SAQA US ID	*UNIT STANDARD TITLE*
116699	Determine, define and evaluate operating parameters of a refrigeration system

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	5

Specific Outcomes:

SPECIFIC OUTCOME 1

Measure or determine and define the operating parameters of refrigeration systems.

SPECIFIC OUTCOME 2

Compare the observations with the design parameters for the plant or with normally expected operatin

SPECIFIC OUTCOME 3

Operate the valves in a typical refrigeration system.

SPECIFIC OUTCOME 4

Explain commonly used terms for operating parameters of refrigeration systems.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 27

Diagnose and repair air-conditioners in vehicles

SAQA US ID	*UNIT STANDARD TITLE*
116708	Diagnose and repair air-conditioners in vehicles

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Diagnose air conditioners in vehicles.

SPECIFIC OUTCOME 2

Repair fault in air-conditioners in vehicles.

SPECIFIC OUTCOME 3

Test air conditioners in vehicles.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 28

Dismantle and assemble air conditioning and refrigeration equipment

SAQA US ID	*UNIT STANDARD TITLE*
116712	Dismantle and assemble air conditioning and refrigeration equipment

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	6

Specific Outcomes:

SPECIFIC OUTCOME 1

State the purpose of dismantling and assembly.

SPECIFIC OUTCOME 2

Plan the dismantling and assembly operation.

SPECIFIC OUTCOME 3

Carry out dismantling and assembly activities.

SPECIFIC OUTCOME 4

Post-assembly activities.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 29

Explain the operation of the components and the associated controls, safety devices and defrost systems

SAQA US ID	*UNIT STANDARD TITLE*
116709	Explain the operation of the components and the associated controls, safety devices and defrost systems

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	10

Specific Outcomes:

SPECIFIC OUTCOME 1

Explain the differences in operation between the basic and the actual vapour compression refrigerati

SPECIFIC OUTCOME 2

Compare and discuss the various types of vapour compression refrigeration systems.

SPECIFIC OUTCOME 3

Explain the effect of actual operating conditions on the performance of the various components in th

SPECIFIC OUTCOME 4

List, identify and state the purpose of refrigerant control devices.

SPECIFIC OUTCOME 5

Explain the operation of refrigerant control devices.

SPECIFIC OUTCOME 6

List the commonly applied controls and safety devices for refrigeration plants and explain their pur

SPECIFIC OUTCOME 7

Identify refrigeration plant control and safety devices.

SPECIFIC OUTCOME 8

List the commonly used defrost systems and explain their purpose and operation.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 30

Fault find an air-conditioning, refrigeration or ventilation plant stoppage or failure

SAQA US ID	*UNIT STANDARD TITLE*
116697	Fault find an air-conditioning, refrigeration or ventilation plant stoppage or failure

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	5

Specific Outcomes:

SPECIFIC OUTCOME 1

Prepare for the task of faultfinding a plant.

SPECIFIC OUTCOME 2

Establish possible electrical faults causing the plant stoppage.

SPECIFIC OUTCOME 3

Establish possible control faults causing the plant stoppage.

SPECIFIC OUTCOME 4

Establish possible mechanical faults causing the plant stoppage.

SPECIFIC OUTCOME 5

Report back to supervisor or client.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 31

Fault find, repair and maintain AC motors, circuitry and controls as applied to air conditioning, refrigeration and ventilation installations

SAQA US ID	*UNIT STANDARD TITLE*
116463	Fault find, repair and maintain AC motors, circuitry and controls as applied to air conditioning, refrigeration and ventilation installations

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-ENG-0-SGB ARV	Regular	Level 3	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Plan to maintain electric motors, circuitry and controls.

SPECIFIC OUTCOME 2

Prepare to maintain electric motors, circuitry and controls.

SPECIFIC OUTCOME 3

Maintain AC motors, circuitry and controls.

SPECIFIC OUTCOME 4

Identify and repair faults on AC motors, circuitry and controls.

SPECIFIC OUTCOME 5

Replace any and all faulty components.

SPECIFIC OUTCOME 6

Complete the work task.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 32

Handle and place in position equipment used within the air-conditioning, refrigeration and ventilation industries

SAQA US ID	*UNIT STANDARD TITLE*
116701	Handle and place in position equipment used within the air-conditioning, refrigeration and ventilation industries

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Plan the moving or lifting of heavy equipment.

SPECIFIC OUTCOME 2

Prepare to move or lift heavy equipment.

SPECIFIC OUTCOME 3

Prepare the equipment to be moved or lifted.

SPECIFIC OUTCOME 4

Move or lift heavy equipment.

SPECIFIC OUTCOME 5

Provide information to a rigger to enable him to rig safely and without damage.

SPECIFIC OUTCOME 6

Complete the moving or rigging operation.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 33

Identify and apply insulation methods and materials for piping and flat surfaces as applicable to air-conditioning and refrigeration systems

SAQA US ID	*UNIT STANDARD TITLE*
116707	Identify and apply insulation methods and materials for piping and flat surfaces as applicable to air-conditioning and refrigeration systems

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Identify insulation methods and materials used for piping and flat surfaces.

SPECIFIC OUTCOME 2

Explain properties and applications of different materials.

SPECIFIC OUTCOME 3

Plan application of insulation and vapour barrier.

SPECIFIC OUTCOME 4

Apply insulation and vapour barrier material to piping and flat surfaces.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 34

Identify and commission modulating control systems as used in air conditioning and refrigeration systems

SAQA US ID	*UNIT STANDARD TITLE*
116465	Identify and commission modulating control systems as used in air conditioning and refrigeration systems

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	6

Specific Outcomes:

SPECIFIC OUTCOME 1

List and discuss the types of modulating control systems and explain their function and operation.

SPECIFIC OUTCOME 2

State and describe the three categories of control devices used on air conditioning and refrigeratio

SPECIFIC OUTCOME 3

List the commonly used types of sensors and describe their application.

SPECIFIC OUTCOME 4

Connect and commission modulating control devices.

SPECIFIC OUTCOME 5

Commission modulating control systems.

SPECIFIC OUTCOME 6

Check system operating parameters.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 35

Identify water reticulation systems, its components, accessories and controls used in air-conditioning and refrigeration installations

SAQA US ID	*UNIT STANDARD TITLE*
116718	Identify water reticulation systems, its components, accessories and controls used in air-conditioning and refrigeration installations

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Identify and state the purpose of various water reticulation systems.

SPECIFIC OUTCOME 2

Identify and state the purpose of the various components and accessories used in water piping system

SPECIFIC OUTCOME 3

Identify and state purpose of control of water flow in water piping systems.

SPECIFIC OUTCOME 4

Sketch and describe the layout and installation of the various water piping systems.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 36

Identify, handle and sample refrigeration oils for analysis, and demonstrate how oil can indicate the general condition of a refrigeration system

SAQA US ID	*UNIT STANDARD TITLE*
116702	Identify, handle and sample refrigeration oils for analysis, and demonstrate how oil can indicate the general condition of a refrigeration system

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Engineering and Related Design

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-ENG-0-SGB ARV	Regular	Level 3	2

Specific Outcomes:

SPECIFIC OUTCOME 1

Identify refrigeration oils.

SPECIFIC OUTCOME 2

List and explain the precautions to take when handling and storing new refrigeration oil to prevent

SPECIFIC OUTCOME 3

Demonstrate the handling and storing of refrigeration oil to prevent it from becoming contaminated a

SPECIFIC OUTCOME 4

Assess and report on the general condition of the refrigeration system from observing the oil in the

SPECIFIC OUTCOME 5

Demonstrate how to obtain an oil sample for analysis.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 37

Identify, use and maintain power tools used in the air-conditioning, refrigeration and ventilation trades

SAQA US ID	*UNIT STANDARD TITLE*
116696	Identify, use and maintain power tools used in the air-conditioning, refrigeration and ventilation trades

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Identify power tools used in the air conditioning, refrigeration and ventilation trades.

SPECIFIC OUTCOME 2

Use power tools.

SPECIFIC OUTCOME 3

Maintain power tools.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 38

Inspect and maintain electrical control panels and circuitry as used for air-conditioning, refrigeration and ventilation installations

SAQA US ID	*UNIT STANDARD TITLE*
116466	Inspect and maintain electrical control panels and circuitry as used for air-conditioning, refrigeration and ventilation installations

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Prepare to inspect and maintain electrical panels.

SPECIFIC OUTCOME 2

Inspect and maintain electrical control panel.

SPECIFIC OUTCOME 3

Inspect and maintain electrical circuitry in electrical control panels.

SPECIFIC OUTCOME 4

Conclude the inspection and maintenance of electrical panels.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 39

Install and service power transmission systems for air-conditioning, refrigeration and ventilation equipment

SAQA US ID	*UNIT STANDARD TITLE*
116713	Install and service power transmission systems for air-conditioning, refrigeration and ventilation equipment

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Install and align belt drives.

SPECIFIC OUTCOME 2

Install and align couplings.

SPECIFIC OUTCOME 3

Service belt and couplings drives.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 40

Install direct driven transport refrigeration systems

SAQA US ID	*UNIT STANDARD TITLE*
116711	Install direct driven transport refrigeration systems

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Prepare to install the equipment.

SPECIFIC OUTCOME 2

Install the equipment.

SPECIFIC OUTCOME 3

Connect the unit electrically.

SPECIFIC OUTCOME 4

Carry out post-installation work.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 41

Install eutectic and multi compartment transport refrigeration systems

SAQA US ID	*UNIT STANDARD TITLE*
116716	Install eutectic and multi compartment transport refrigeration systems

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Explain and discuss the operation of the eutectic refrigeration system as applied to transport refri

SPECIFIC OUTCOME 2

Prepare to install the equipment.

SPECIFIC OUTCOME 3

Install the equipment.

SPECIFIC OUTCOME 4

Test the unit for operation

SPECIFIC OUTCOME 5

Carry out post-installation work.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 42

Interpret air-conditioning, refrigeration and ventilation plant layout and component drawings, sketches and specifications

SAQA US ID	*UNIT STANDARD TITLE*
116717	Interpret air-conditioning, refrigeration and ventilation plant layout and component drawings, sketches and specifications

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	6

Specific Outcomes:

SPECIFIC OUTCOME 1

State the purpose of technical drawings and specifications.

SPECIFIC OUTCOME 2

List the methods of communicating technical information on drawings and in specifications.

SPECIFIC OUTCOME 3

Interpret technical drawing.

SPECIFIC OUTCOME 4

Identify components and manufacturing/assembly procedures from drawings.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 43

Join and install refrigerant piping

SAQA US ID	*UNIT STANDARD TITLE*
116229	Join and install refrigerant piping

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	9

Specific Outcomes:

SPECIFIC OUTCOME 1

Prepare to install refrigerant piping.

SPECIFIC OUTCOME 2

Plan the installation of refrigerant piping.

SPECIFIC OUTCOME 3

Prepare to install refrigerant piping.

SPECIFIC OUTCOME 4

Form brazed joints.

SPECIFIC OUTCOME 5

Form non-brazed joints.

SPECIFIC OUTCOME 6

Install piping and accessories.

SPECIFIC OUTCOME 7

Test installation for leaks.

SPECIFIC OUTCOME 8

Clear site and hand over the installation.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 44

Lead a team, plan, allocate and assess their work

SAQA US ID	*UNIT STANDARD TITLE*
116714	Lead a team, plan, allocate and assess their work

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Plan the work activities of a team.

SPECIFIC OUTCOME 2

Assess and report on team member performance and issues within the team.

SPECIFIC OUTCOME 3

Allocate work to team members.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 45

List the commonly applied air-conditioning systems, state their application and explain their operation

SAQA US ID	*UNIT STANDARD TITLE*
116710	List the commonly applied air-conditioning systems, state their application and explain their operation

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Define air-conditioning, explain its function and name and describe the commonly applied types of ai

SPECIFIC OUTCOME 2

Name the commonly applied categories of air conditioning systems and sub systems, explain their oper

SPECIFIC OUTCOME 3

Explain the operation and control of the economy cycle as applied to the all-air systems of air-cond

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 46

Maintain safety in the handling group 1 and 2 refrigerants

SAQA US ID	*UNIT STANDARD TITLE*
116700	Maintain safety in the handling group 1 and 2 refrigerants

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	9

Specific Outcomes:

SPECIFIC OUTCOME 1

Transfer refrigerant from a container to a service cylinder or a dial-a-charge.

SPECIFIC OUTCOME 2

Recover refrigerant from a charged system and transfer it into a service cylinder.

SPECIFIC OUTCOME 3

Leak test a system.

SPECIFIC OUTCOME 4

Evacuate a system.

SPECIFIC OUTCOME 5

Charge an evacuated system with refrigerant.

SPECIFIC OUTCOME 6

Handle, check and store recovered compressor oil and refrigerant.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 47

Maintain safety in the handling of ammonia refrigerant

SAQA US ID	*UNIT STANDARD TITLE*
116704	Maintain safety in the handling of ammonia refrigerant

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	9

Specific Outcomes:

SPECIFIC OUTCOME 1

Explain and discuss the use of ammonia in refrigerating systems.

SPECIFIC OUTCOME 2

Identify safe procedures in the handling of ammonia.

SPECIFIC OUTCOME 3

Practice safe procedures in the handling of ammonia.

SPECIFIC OUTCOME 4

Charge a system with ammonia refrigerant.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 48

Operate water treatment systems used in air-conditioning and refrigeration installations

SAQA US ID	*UNIT STANDARD TITLE*
116706	Operate water treatment systems used in air-conditioning and refrigeration installations

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	3

Specific Outcomes:

SPECIFIC OUTCOME 1

Explain the reasons for water treatment.

SPECIFIC OUTCOME 2

Explain the effect of non-treatment of the water.

SPECIFIC OUTCOME 3

Obtain water samples from each of the circuits.

SPECIFIC OUTCOME 4

Explain and demonstrate the safety precautions to take and the personal protective equipment (PPE) t

SPECIFIC OUTCOME 5

Dose each circuit with the correct chemical(s) and in the amount prescribed in the analyst's report.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 49

Remove, install and service bearings used on air-conditioning, refrigeration and ventilation equipment

SAQA US ID	*UNIT STANDARD TITLE*
116715	Remove, install and service bearings used on air-conditioning, refrigeration and ventilation equipment

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	6

Specific Outcomes:

SPECIFIC OUTCOME 1

State the principle of operation and identify the various types of bearings.

SPECIFIC OUTCOME 2

State and explain typical applications of the various types of bearings.

SPECIFIC OUTCOME 3

State the purpose of removing installing and servicing bearings.

SPECIFIC OUTCOME 4

Carry out removal, installation and servicing of bearings.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 50

Show understanding of diversity in the workplace

SAQA US ID	*UNIT STANDARD TITLE*
116720	Show understanding of diversity in the workplace

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	3

Specific Outcomes:

SPECIFIC OUTCOME 1

Demonstrate an understanding of cultural and other differences in the workplace.

SPECIFIC OUTCOME 2

List and understand the concept stereotypes in the workplace.

SPECIFIC OUTCOME 3

Demonstrate a basic understanding of the role of change in the workplace.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 51

Sketch and construct three-phase circuits as used in air-conditioning, refrigeration and ventilation installations

SAQA US ID	*UNIT STANDARD TITLE*
116464	Sketch and construct three-phase circuits as used in air-conditioning, refrigeration and ventilation installations

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Identify symbols, components and loads.

SPECIFIC OUTCOME 2

Sketch and interpret typical basic three-phase circuit diagrams.

SPECIFIC OUTCOME 3

Construct typical basic three-phase circuit diagrams.

SPECIFIC OUTCOME 4

Convert any electrical line diagram to a drawing complying with international standards.

SPECIFIC OUTCOME 5

Complete the task.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 52

Supply and fit air conditioners to vehicles

SAQA US ID	*UNIT STANDARD TITLE*
116705	Supply and fit air conditioners to vehicles

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 3	3

Specific Outcomes:

SPECIFIC OUTCOME 1

Select air-conditioning kit.

SPECIFIC OUTCOME 2

Fit air-conditioning kit to vehicle.

SPECIFIC OUTCOME 3

Charge system.

SPECIFIC OUTCOME 4

Test installation.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 53

Commission air-conditioning and ventilation systems

SAQA US ID	*UNIT STANDARD TITLE*
116375	Commission air-conditioning and ventilation systems

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Plan and organise the commissioning of the air-conditioning plant

SPECIFIC OUTCOME 2

Carry out pre-start up checks.

SPECIFIC OUTCOME 3

Set plant in operation.

SPECIFIC OUTCOME 4

Check and verify operation of plant.

SPECIFIC OUTCOME 5

Hand over plant and complete commissioning documentation.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 54

Commission and maintain transport refrigeration systems

SAQA US ID	*UNIT STANDARD TITLE*
116396	Commission and maintain transport refrigeration systems

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Plan the commissioning of a transport refrigeration system.

SPECIFIC OUTCOME 2

Organize the commissioning of a transport refrigeration system.

SPECIFIC OUTCOME 3

Commission a transport refrigeration system.

SPECIFIC OUTCOME 4

Observe and record all operating parameters.

SPECIFIC OUTCOME 5

Complete commissioning documentation.

SPECIFIC OUTCOME 6

Service a transport refrigeration system.

SPECIFIC OUTCOME 7

Check and explain the purpose and operation of a defrost system.

SPECIFIC OUTCOME 8

Set a transport refrigeration system in operation.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 55

Commission refrigeration systems

SAQA US ID	*UNIT STANDARD TITLE*
116415	Commission refrigeration systems

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Plan and organise the commissioning of the refrigeration plant.

SPECIFIC OUTCOME 2

Carry out pre-start up checks.

SPECIFIC OUTCOME 3

Charge plant and confirm operation of systems.

SPECIFIC OUTCOME 4

Check and verify operation of plant.

SPECIFIC OUTCOME 5

Hand over plant and complete commissioning documentation.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 56

Demonstrate an understanding of logic controllers as used in air conditioning, refrigeration and ventilation applications

SAQA US ID	*UNIT STANDARD TITLE*
116460	Demonstrate an understanding of logic controllers as used in air conditioning, refrigeration and ventilation applications

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	7

Specific Outcomes:

SPECIFIC OUTCOME 1

List and discuss the functions and applications of logic controllers.

SPECIFIC OUTCOME 2

Explain the purpose and application of pre-programmed logic controllers as fitted to air conditionin

SPECIFIC OUTCOME 3

Explain the purpose and application of programmable logic controllers as used in air conditioning, r

SPECIFIC OUTCOME 4

Demonstrate an understanding of the input/output peripherals for a programmable logic controller.

SPECIFIC OUTCOME 5

Demonstrate an understanding of field devices interfaced to programmable logic controllers.

SPECIFIC OUTCOME 6

Demonstrate an understanding of the processor in a logic controller.

SPECIFIC OUTCOME 7

Demonstrate an understanding of the programming terminal (the interface).

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 57

Demonstrate knowledge of the OHS Act applicable to technicians employed in the air-conditioning, refrigeration and ventilation industries

SAQA US ID	*UNIT STANDARD TITLE*
116379	Demonstrate knowledge of the OHS Act applicable to technicians employed in the air-conditioning, refrigeration and ventilation industries

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Interpret section 17 of the OHS ACT.

SPECIFIC OUTCOME 2

Interpret section 18 of the OHS ACT.

SPECIFIC OUTCOME 3

Interpret section 37 of the OHS ACT.

SPECIFIC OUTCOME 4

Interpret the applicable sections of the "driven machine regulations".

SPECIFIC OUTCOME 5

Interpret the applicable sections of the "electrical installation regulations".

SPECIFIC OUTCOME 6

Interpret the applicable sections of the "electrical machinery regulations".

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 58

Determine if refrigeration plants operating with a group 1 refrigerant conform to the regulations in SANS 10147

SAQA US ID	*UNIT STANDARD TITLE*
116397	Determine if refrigeration plants operating with a group 1 refrigerant conform to the regulations in SANS 10147

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Briefly describe the objectives and requirements of SANS 10147 (SABS 0147).

SPECIFIC OUTCOME 2

Name and briefly describe the different types of refrigeration systems listed in SANS 10147 (SABS 01

SPECIFIC OUTCOME 3

Define some of the definitions used in SANS 10147 (SABS 0147) and state the requirements for persona

SPECIFIC OUTCOME 4

List and discuss the regulations regarding pressure-relief devices, pressure limiting devices, press

SPECIFIC OUTCOME 5

List and discuss the regulations regarding machinery areas, plant rooms and cold rooms.

SPECIFIC OUTCOME 6

List and discuss the requirements regarding the operation, maintenance and the provision for servici

SPECIFIC OUTCOME 7

List and discus the regulations regarding charging, discharging or substituting refrigerants.

SPECIFIC OUTCOME 8

List and discuss the regulations regarding field tests on refrigerating systems.

SPECIFIC OUTCOME 9

Generate a report on an installation subject to SANS 10147 (SABS 0147) which states where the instal

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 59

Diagnose operational faults in refrigeration systems and take remedial action or propose corrective action

SAQA US ID	*UNIT STANDARD TITLE*
116406	Diagnose operational faults in refrigeration systems and take remedial action or propose corrective action

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Establish the extent of the problem.

SPECIFIC OUTCOME 2

Diagnose the problem.

SPECIFIC OUTCOME 3

Demonstrate the use of trouble shooting procedures.

SPECIFIC OUTCOME 4

Faults are corrected if possible.

SPECIFIC OUTCOME 5

Correct faults or propose remedial action.

Established in terms of Act 58 of 1995

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 60

Explain function and operation of refrigeration circuits as applied to air-conditioning or refrigeration systems and select and explain the function of components, accessories and controls

SAQA US ID	*UNIT STANDARD TITLE*
116418	Explain function and operation of refrigeration circuits as applied to air-conditioning or refrigeration systems and select and explain the function of components, accessories and controls

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Explain the function and operation of various types of refrigeration systems.

SPECIFIC OUTCOME 2

Explain the function and principles of operation of various refrigeration system components and acce

SPECIFIC OUTCOME 3

Explain the function and operation of various refrigeration system controls.

SPECIFIC OUTCOME 4

Prepare for selecting components and accessories.

SPECIFIC OUTCOME 5

Select components and accessories.

SPECIFIC OUTCOME 6

Record results of selection of components and accessories.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 61

Explain the need for water treatment and the methods and equipment used

SAQA US ID	*UNIT STANDARD TITLE*
116377	Explain the need for water treatment and the methods and equipment used

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Explain the long-term effects untreated water has on chilled water circuits and the consequent effec

SPECIFIC OUTCOME 2

Explain the long-term effects untreated water has on condenser water circuits and the consequent eff

SPECIFIC OUTCOME 3

Explain the long-term effects untreated water has on hot water circuits and the consequent effect on

SPECIFIC OUTCOME 4

Explain the long-term effects untreated spray water has on closed circuit water coolers or on evapor

SPECIFIC OUTCOME 5

Describe what methods are available to counteract the adverse effects that untreated water has on th

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 62

List, define and discuss the characteristics of commonly used refrigerants used in the refrigeration industry

SAQA US ID	*UNIT STANDARD TITLE*
116408	List, define and discuss the characteristics of commonly used refrigerants used in the refrigeration industry

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	4

Specific Outcomes:

SPECIFIC OUTCOME 1

List the commonly used refrigerants and name and discuss their desirable and undesirable physical ch

SPECIFIC OUTCOME 2

Name and define the thermodynamic properties of commonly used refrigerants.

SPECIFIC OUTCOME 3

Plot the refrigeration cycle on the Pressure-Enthalpy diagram and determine the refrigerant properti

SPECIFIC OUTCOME 4

Motivate the selection of a refrigerant.

SPECIFIC OUTCOME 5

State and discuss typical applications for the commonly used refrigerants.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 63

Monitor an air-conditioning, refrigeration or ventilation system through the building management system

SAQA US ID	*UNIT STANDARD TITLE*
116413	Monitor an air-conditioning, refrigeration or ventilation system through the building management system

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Log on to and log off from the computerised BMS system.

SPECIFIC OUTCOME 2

Observe the system operating parameters.

SPECIFIC OUTCOME 3

Determine deviations from the normal design operating set points.

SPECIFIC OUTCOME 4

Identify undesirable or unsuitable operating parameters and trends.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 64

Plot air-conditioning processes on the psychrometric chart and determine plant operating parameters

SAQA US ID	*UNIT STANDARD TITLE*
116411	Plot air-conditioning processes on the psychrometric chart and determine plant operating parameters

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	7

Specific Outcomes:

SPECIFIC OUTCOME 1

Plot the processes occurring in the plants on the psychrometric chart.

SPECIFIC OUTCOME 2

Calculate the amount of sensible and latent heat added or removed.

SPECIFIC OUTCOME 3

Calculate the amount of moisture added or removed.

SPECIFIC OUTCOME 4

Calculate the air volume required for the various processes for a particular load.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 65

Repair and overhaul air-conditioning, refrigeration and ventilation equipment

SAQA US ID	*UNIT STANDARD TITLE*
116421	Repair and overhaul air-conditioning, refrigeration and ventilation equipment

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	8

Specific Outcomes:

SPECIFIC OUTCOME 1

State the purpose of component overhaul and repair.

SPECIFIC OUTCOME 2

Plan the overhaul and repair operation.

SPECIFIC OUTCOME 3

Carry out overhaul and repair activities.

SPECIFIC OUTCOME 4

Carry out post-repair and overhaul activities.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 66

Select control systems and instruments for air conditioning, refrigeration and ventilation plants, determine control parameters and draw control sequence and electrical wiring diagrams

SAQA US ID	*UNIT STANDARD TITLE*
116458	Select control systems and instruments for air conditioning, refrigeration and ventilation plants, determine control parameters and draw control sequence and electrical wiring diagrams

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	7

Specific Outcomes:

SPECIFIC OUTCOME 1

List, explain and discuss the principles of the different types of modulating control systems.

SPECIFIC OUTCOME 2

Interpret the operation of the plant to be controlled.

SPECIFIC OUTCOME 3

Select an appropriate control system.

SPECIFIC OUTCOME 4

Determine the control parameters for all control instruments.

SPECIFIC OUTCOME 5

Select the control instruments.

SPECIFIC OUTCOME 6

Draw the control sequence diagram.

SPECIFIC OUTCOME 7

Draw the wiring diagram for the plant.

SPECIFIC OUTCOME 8

Write the specification for the control system.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 67

Service a refrigeration system and set it in operation

SAQA US ID	*UNIT STANDARD TITLE*
116403	Service a refrigeration system and set it in operation

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Service a refrigeration system.

SPECIFIC OUTCOME 2

Bench-set pressure switches.

SPECIFIC OUTCOME 3

Check and explain the purpose and operation of a defrost system.

SPECIFIC OUTCOME 4

Set a refrigeration system in operation.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 68

Supervise workers at levels 2 and 3

SAQA US ID	*UNIT STANDARD TITLE*
116380	Supervise workers at levels 2 and 3

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	6

Specific Outcomes:

SPECIFIC OUTCOME 1

Plan the work methods and organize resources with individuals and teams.

SPECIFIC OUTCOME 2

Update and achieve work objectives, delegate, control and organize individuals and teams.

SPECIFIC OUTCOME 3

Supervise and manage production, work and services of individuals and teams.

SPECIFIC OUTCOME 4

Evaluate performance of individuals and teams.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 69

Understand basic electrical and mechanical engineering principles as applicable to air conditioning, refrigeration and ventilation

SAQA US ID	*UNIT STANDARD TITLE*
116461	Understand basic electrical and mechanical engineering principles as applicable to air conditioning, refrigeration and ventilation

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	9

Specific Outcomes:

SPECIFIC OUTCOME 1

Explain and apply basic concepts of thermodynamics.

SPECIFIC OUTCOME 2

Explain and apply basic concepts of fluid mechanics.

SPECIFIC OUTCOME 3

Explain and apply basic electrical-magnetic fundamentals.

SPECIFIC OUTCOME 4

Explain and apply basic concepts of engineering mechanics and strength of materials.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 70

Understand, implement, maintain and monitor general quality standards within the air-conditioning, refrigeration and ventilation industries

SAQA US ID	*UNIT STANDARD TITLE*
116392	Understand, implement, maintain and monitor general quality standards within the air-conditioning, refrigeration and ventilation industries

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	8

Specific Outcomes:

SPECIFIC OUTCOME 1

Understand the general quality standards as recommended by the ISO.

SPECIFIC OUTCOME 2

Implement the general quality standards as recommended by the ISO.

SPECIFIC OUTCOME 3

Maintain the general quality standards as recommended by the ISO.

SPECIFIC OUTCOME 4

Monitor the general quality standards as recommended by the ISO.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD: 71

Write a technical report

SAQA US ID	*UNIT STANDARD TITLE*
116389	Write a technical report

SGB NAME	*ABET BAND*	*PROVIDER NAME*
SGB Air-conditioning Refrigeration and Ventilation	Undefined	

FIELD DESCRIPTION	*SUBFIELD DESCRIPTION*
Manufacturing, Engineering and Technology	Manufacturing and Assembly

UNIT STANDARD CODE	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
MET-MNA-0-SGB ARV	Regular	Level 4	4

Specific Outcomes:

SPECIFIC OUTCOME 1

Collect information for writing the report.

SPECIFIC OUTCOME 2

Plan the writing of the report.

SPECIFIC OUTCOME 3

Write the report.

SPECIFIC OUTCOME 4

Revise the report.