Curriculum Document				
Curriculum Code	**Curriculum Title**			
671101000	Occupational Certificate: Qualification: Electrician			
Development Quality Partner	**Name**	**E-mail**	**Phone**	**Logo**
	LG Seta	FrikkieF@lgseta.co.za	011 456 8579	

TABLE OF CONTENT

SECTION 1: CURRICULUM SUMMARY

1 Occupational Information

1.1 Associated Occupation

671101: Electrician

1.2 Occupation or Specialization Addressed by this Curriculum

671101000: Occupational Certificate: Electrician

1.3 Alternative Titles used by Industry

None

2 Curriculum Information

2.1 Relation of this Curriculum to the Occupation and Qualification Progression

- Progression occupations
    - Occupational Certificate: Electrical Engineering Technician
- Horizontal articulation
    - Occupational Certificate: Electrical Installation Inspector
    - Occupational Certificate: Transportation Electrician
    - Occupational Certificate: Refrigeration Mechanic (Air-conditioning and Refrigeration Electrician)
    - Occupational Certificate: Lift Mechanic (Lift Electrician)
- Feeder occupations
    - Occupational Certificate: Electrical and Electronic Equipment Assembler
    - Occupational Certificate: Electrical or Telecommunications Trades Assistant

2.2 Curriculum Structure

This qualification is made up of the following compulsory Knowledge and Practical Skill Modules:

Knowledge Modules:

- 671101000-KM-01: Health, Safety, Quality and Legislation (NQF Level: 4) Credits: 5
- 671101000-KM-02: Tools, Equipment and Materials (NQF Level: 4) Credits: 8
- 671101000-KM-03: Electricity and electronics (NQF Level: 4) Credits: 13

- 671101000-KM-04: Industry Context (NQF Level: 3) Credits: 2
- 671101000-KM-05: Wire ways and wiring (NQF Level: 4) Credits: 11
- 671101000-KM-06: Rotating electrical machinery (NQF Level: 4) Credits: 13
- 671101000-KM-07: Electrical supply systems and components (NQF Level: 4) Credits: 31
- 671101000-KM-08: Low Voltage protection (NQF Level: 4) Credits: 5-
- 671101000-KM-9: Fault Finding (NQF Level: 4) Credits: 3

Total number of credits for Knowledge Modules: 91

Practical Skill Modules:

- 671101000-PM-01, Use hand and power tools, L3, Cr22
- 671101000-PM-02, Plan and prepare process for the wiring, connection, testing, inspecting, commissioning and maintaining of electrical installations and control systems, L3, Cr5
- 671101000-PM-03, Prepare worksite set up for installing, wiring and connecting electrical equipment and control systems, L3, Cr3
- 671101000-PM-04, Install wire-ways, L4, Cr5
- 671101000-PM-05, Install, wire and connect electrical equipment and control systems, L4, Cr38
- 671101000-PM-06, Conduct pre-commission inspection (power off;) fault find and test new and existing installations, L4, Cr5
- 671101000-PM-07, Carry out commissioning tests, L4, Cr13
- 671101000-PM-08, Fault find and repair electrical control systems and electrical installations, L4, Cr22

Total number of credits for Practical Skill Modules: 113

This qualification also requires the following Work Experience Modules:

- 671101000-WM-01, Plan and preparefor the wiring, connection, testing, inspecting, commissioning and maintaining of electrical installations and control systems, L4, Cr 8
- 671101000-WM-02, Processes of installation, wiring and connection of electrical equipment and control systems, L4, Cr74
- 671101000-WM-03, Processes of testing and inspecting of electrical equipment, control systems and installations, L4, Cr15

- 671101000-WM-04, Processes of commissioning electrical installations and control systems, L4, Cr15
- 671101000-WM-05, Maintenance processes for electrical installations and control systems, L4, Cr 44

Total number of credits for Work Experience Modules: 156

2.2.1 Details of Knowledge Modules

2.2.1.1 671101000-KM-01: Health, Safety, Quality and Legislation, L4, Cr 5

The main focus of the learning in this knowledge module is to build an understanding of the health, safety and other legislative requirements for the practise of an Electrician.

The learning will enable learners to demonstrating an understanding of:

KM-01-KT01: Safety, health, environment, risk and quality principles in the workplace (100%)

2.2.1.2 671101000-KM-02: Tools, Equipment and Materials, L4, Cr 8

The main focus of the learning in this knowledge module is to build an understanding of the theory required for the use of hand tools, power tools and measuring and testing instruments to practise as an Electrician.

The learning will enable learners to demonstrate an understanding of:

KM-02-KT01: Hand tools and power tools (5%)

KM-02-KT02: Measuring and testing instruments (50%)

2.2.1.3 671101000-KM-03: Electricity and electronics, L4, Cr 13

The main focus of the learning in this knowledge module is to build an understanding of the theory of electricity and electronics required to practise as an Electrician.

The learning will enable learners to demonstrate an understanding of:

KM-03-KT01: Fundamentals of electricity (35%)

KM-03-KT02: Electronics (30%)

KM-03-KT03: Electrical principles of appliances (35%)

2.2.1.4 671101000-KM-04: Industry Context, L3, Cr 2

The main focus of the learning in this knowledge module is to build an understanding of the industry context of a Electrician.

The learning will enable learners to demonstrating an understanding of:
KM-04-KT01: Introduction to the world of work and the electrical trade (100%)

2.2.1.5 671101000-KM-05: Wire ways and wiring, L4, Cr 11

The main focus of the learning in this knowledge module is to build an understanding of the theory of wire ways and wiring required to practise as an Electrician.

The learning will enable learners to demonstrate an understanding of:
KM-05-KT01: Wire ways (35%)
KM-05-KT02: Wiring of installations (35%)
KM-05-KT03: Earthing and bonding (30%)

2.2.1.6 671101000-KM-06: Rotating electrical machinery, L4, Cr 13

The main focus of the learning in this knowledge module is to build an understanding of the theory of rotating electrical machinery required to practise as an Electrician.

The learning will enable learners to demonstrate an understanding of:
KM-06-KT01: Rotating electrical machinery - AC motors (35%)
KM-06-KT02: Rotating Electrical Machinery - DC motors (35%)
KM-06-KT03: Rotating electrical machinery - Alternators and Generators (30%)

2.2.1.7 671101000-KM-07: Electrical supply systems and components, L4, Cr 31

The main focus of the learning in this knowledge module is to build an understanding of the theory of electrical supply systems and components required to practise as an Electrician.

The learning will enable learners to demonstrating an understanding of:
KM-07-KT01: Concepts, theories and principles of supply Systems (20%)
KM-07-KT02: Batteries (10%)
KM-07-KT03: Transformers (20%)
KM-07-KT04: Types of cables and applications (20%)
KM-07-KT05: Switchgear and control gear (20%)
KM-07-KT06: Lighting systems (10%)

2.2.1.8 671101000-KM-08: Low Voltage protection, L4, Cr5

The main focus of the learning in this knowledge module is to build an understanding of the theory of low voltage protection required to practise as an Electrician.

The learning will enable learners to demonstrate an understanding of:
KM-08-KT01: Low voltage protection (100%)

2.2.1.9 671101000-KM-9: Fault Finding, L4, Cr 3

The main focus of the learning in this knowledge module is to build an understanding of the theory of fault finding required to practise as an Electrician.

The learning will enable learners to demonstrate an understanding of:
KM-09-KT01: Fault finding (5%)

2.2.2 Details of Practical Skill Modules

2.2.2.1 671101000-PM-01, Use hand, power and measuring tools, L3, Cr28

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to preparing the use of hand, power and measuring tools.

The learner will be required to:
PM-01-PS01: Select, use and care of engineering hand tools
PM-01-PS02: Select, use and care for power tools
PM-01-PS03: Select, use and care for electrical measuring instruments
PM-01-PS04: Perform soldering activities
PM-01-PS05: Carry out basic electric arc welding in an electrical environment
PM-01-PS06: Carry out basic gas cutting in an electrical environment

2.2.2.2 671101000-PM-02, Plan worksite set up for installing, wiring and connecting electrical equipment and control systems, L3, Cr5

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to plan a worksite set up for installing, wiring and connecting electrical equipment and control systems

The learner will be required to:
PM-02-PS01: Undertake risk assessment in accordance with all statutory requirements

PM-02-PS02: Read and interpret electrical drawings
PM-02-PS03: Plan the worksite set-up

2.2.2.3 671101000-PM-03, Prepare worksite set up for installing, wiring and connecting electrical equipment and control systems, L3, Cr30

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to prepare a worksite set up for installing, wiring and connecting electrical equipment and control systems

The learner will be required to:
PM-03-PS01: Procure resources
PM-03-PS02: Prepare and transport resources
PM-03-PS03: Prepare work site, equipment, tools, consumables and materials

2.2.2.4 671101000-PM-04, Install wire-ways, L4, Cr5

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to installing wire-ways.

The learner will be required to:
PM-04-PS01: Confirm the selection and installation method of the selected wire ways
PM-04-PS02: Use installation tools and equipment
PM-04-PS03: Design and install wire ways

2.2.2.5 671101000-PM-05, Install, wire and connect electrical equipment and control systems, L3, Cr38

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to install, wire and connect electrical equipment and control systems.

The learner will be required to:
PM-05-PS01: Identify hazards within the installation
PM-05-PS02: Confirm the selection and installation method of the electrical equipment and control systems
PM-05-PS03: Use installation tools and personal protective equipment
PM-05-PS04: Install equipment and control systems

PM-05-PS05: Wire electrical equipment and control systems
PM-05-PS06: Terminate and connect cables and conductors

2.2.2.6 671101000-PM-06, Conduct pre-commission inspection (power off) and test new and existing installations, L3, Cr5

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to inspecting (power off) and testing new and existing installations.

The learner will be required to:
PM-06-PS01: Inspect electrical equipment, control systems and installations under power off conditions
PM-06-PS02: Test electrical equipment, control systems and installations under power off conditions

2.2.2.7 671101000-PM-07, Carrying out commissioning tests, L3, Cr13

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to carrying out commissioning tests

The learner will be required to:
PM-07-PS01: Carry out commissioning tests (with power on) on electrical installations and control systems
PM-07-PS02: Rectify defects found on electrical installations and control systems
PM-07-PS03: Report product deficiencies and rectify workmanship

2.2.2.8 671101000-PM-08, Fault find and repair electrical control systems and electrical installations, L4, Cr22

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related tofault find and repair electrical control systems and electrical installations

The learner will be required to:
PM-08-PS01: Obtain work instructions and gather drawings and documentation
PM-08-PS02: Select tools and testing instruments
PM-08-PS03: Carry out fault finding

PM-08-PS04: Rectify faults where applicable
PM-08-PS05: Record findings and provide feedback

2.2.3 Details of Work Experience Modules

2.2.3.1 671101000-WM-01, Planning and preparation process for the wiring, connection, testing, inspecting, commissioning and maintaining of electrical installations and control systems, L4, Cr10

The focus of the work experience is on providing the learner an opportunity to:
Gain exposure to work as part of a team in the planning and preparation process for the wiring, connection, testing, inspecting, commissioning and maintaining of electrical installations and control systems in a real life electrical environment. The Learner will be required to successfully complete each Work Experience at least three (3) times.

The learner will be required to:
WM-01-WE01: Observe and assist a qualified person in the planning and preparation process for electrical installations and control systems
WM-01-WE02: Plan and prepare for electrical installations and control systems under the direct supervision of a qualified person
WM-01-WE03: Undertake all activities without assistance, but under supervision, to plan and prepare for electrical installations

2.2.3.2 671101000-WM-02, Processes of installing, wiring and connecting of electrical equipment and control systems, L4, Cr72

The focus of the work experience is on providing the learner an opportunity to:
Gain exposure to work as part of a team in the process of wiring, connection of electrical equipment and control systems in a real life electrical environment. The Learner will be required to successfully complete each Work Experience at least three (3) times.

The learner will be required to:
WM-02-WE01: Observe and assist a qualified electrician in the processes of installation, wiring and connection of electrical equipment and control systems
WM-02-WE02: Install, wire and connect electrical equipment and control systems under the direct supervision of a qualified electrician
WM-02-WE03: Undertake all activities without assistance, but under supervision, to install, wire and connect electrical equipment and control systems

2.2.3.3 671101000-WM-03, Processes of testing and inspecting of electrical equipment, control systems and installations, L4, Cr19

The focus of the work experience is on providing the learner an opportunity to:

Gain exposure to work as part of a team in the processes of testing and inspecting of electrical equipment, control systems and installations in a real life electrical environment. The Learner will be required to successfully complete each Work Experience at least three (3) times.

The learner will be required to:

WM-03-WE01: Observe and assist a qualified person in the processes of testing and inspecting of electrical equipment, control systems and installations

WM-03-WE02: Processes of testing and inspecting of electrical equipment, control systems and installations under the direct supervision of a qualified person

WM-03-WE03: Undertake all activities without assistance, but under supervision, in the processes of testing and inspecting of electrical equipment, control systems and installations

2.2.3.4 671101000-WM-04, Processes of commissioning electrical installations and control systems, L4, Cr19

The focus of the work experience is on providing the learner an opportunity to:

Gain exposure to work as part of a team in the processes of commissioning electrical installations and control systems in a real life electrical environment. The Learner will be required to successfully complete each Work Experience at least three (3) times.

The learner will be required to:

WM-04-WE01: Observe and assist a qualified person in the processes of commissioning electrical installations and control systems

WM-04-WE02: Processes of commissioning electrical installations and control systems under the direct supervision of a qualified person

WM-04-WE03: Undertake all activities without assistance, but under supervision, to commission electrical installations and control systems

2.2.3.5 671101000-WM-05, Maintenance processes for equipment, control systems and electrical installations, L4, Cr36

The focus of the work experience is on providing the learner an opportunity to:

Gain exposure to work as part of a team in the maintenance processes for equipment, control systems and electrical installations in a real life electrical environment. The Learner will be required to successfully complete each Work Experience at least three (3) times.

The learner will be required to:
WM-05-WE01: Observe and assist a qualified person in the maintenance processes for equipment, control systems and electrical installations
WM-05-WE02: Maintenance processes for equipment, control systems and electrical installations under the direct supervision of a qualified person
WM-05-WE03: Undertake all activities without assistance, but under supervision, in maintenance processes for equipment, control systems and electrical installations

2.3 International Comparability

This International comparability study was undertaken to examine a selected number of electrical trades/occupations, including their levels of qualifications and related curricula. The purpose is to provide baseline information towards benchmarking of the electrical curricula under development for all sectors in South Africa.

The review included 5 countries: Australia, New Zealand, United Kingdom, Canada and South Africa. New Zealand and Australia were considered to be the most appropriate countries with which to compare with South Africa. Amongst the Southern African Development Community (SADC) there are countries which align with the United Kingdom's model of Vocational Education and Training (VET), through the London City and Guilds qualification framework and the National Vocational Qualification system (NVQ). Despite the fact that SADC countries are not as industrialised as the United Kingdom, it could be concluded that countries using the British qualifications compare favourably to similar South African qualifications as discussed under the U.K. section. In all SADC countries researched, none currently have an active training infrastructure in electrical engineering.

CONCLUSION

The findings reveal that the South African Occupational Electrical is in general comparable to what is found in the chosen benchmarked countries. The comparison mainly extends to the qualifications awarded, level of qualification, modes of delivery and to some extent the contents of the curricula. South Africa was found to generally have more detailed curricula. The difficulty in comparing curricula is that units/unit standards are shared between qualifications from levels 2-5 in the reviewed countries thus a direct comparison on the

higher levels become skewed. In the study it become apparent that the qualifications that were inspected in the selected countries were broken down into smaller units pitched between the levels 2-5. In terms of content the South African qualification compared variably to the other qualifications/programmes.

2.4 Entry Requirements

NQF Level 1 qualification with Mathematics and Science

(NOTE: The learner must be age 16 and over)

3 Assessment Quality Partner Information

Name of body: National Artisan Moderation Body (NAMB)
Address of body: 123 Schoeman Street; PRETORIA; 0001
Contact person name: Nic Louw
Contact person work telephone number: Tel: 011 206 1015

4. Modules of Employable Skills

None

5. Learning Programmes

This curriculum does not have any associated learning programmes

SECTION 2: OCCUPATIONAL PROFILE

1 Occupational Purpose

The purpose of this qualification is to prepare a learner to operate as an **electrician.**

Installs, tests, connects, commissions, maintains and alter/repair electrical equipment, wiring and control systems

2 Occupational Tasks

Planning and preparing work site, equipment, tools, consumables and materials for electrical activities and operations.
Installing, wiring, connecting electrical equipment and control systems
Testing and inspecting electrical equipment, control systems and installations
Commissioning control systems and installations
Maintaining and repairing electrical equipment, control systems and installations

3 Occupational Task Details

3.1 Planning and preparing work site, equipment, tools, consumables and materials for electrical activities and operations

Unique Product or Service:

Prepared and equipped worksite

Occupational Responsibilities*:*

i) Plan worksite set up for installing, wiring and connecting electrical equipment and control systems
ii) Prepare worksite set up for installing, wiring and connecting electrical equipment and control systems

Occupational Contexts:

i) Planning and preparation process for electrical installations and control systems in the mining or construction or municipality or energy or manufacturing or railways or chemical or agricultural or navy environment

3.2 Installing, wiring, connecting electrical equipment and control systems

Installed equipment and control systems

Occupational Responsibilities:

i) Install and repair wire-ways

ii) Install, wire and connect electrical equipment and control systems

Occupational Contexts:

i) Processes of installation, wiring and connection of electrical equipment and control systems

3.3 Testing and inspecting electrical equipment, control systems and installations

Unique Product or Service*:*

Compliant electrical equipment, control systems and installations

Occupational Responsibilities:

i) Conduct pre-commission inspection (power on and off;) and test for new and existing installations

ii) Conduct fault finding and test for existing installations and modified installations

Occupational Contexts:

i) Processes of testing and inspecting of electrical equipment, control systems and installations

3.4 Commissioning electrical installations and control systems

Functional electrical installations and control systems

Occupational Responsibilities:

i) Carrying out commissioning tests

Occupational Contexts:

i) Processes of commissioning electrical installations and control systems

3.5 Maintaining and repairing electrical equipment, control systems and installations

Unique Product or Service*:*

Optimal functioning equipment, control systems and installations in compliance with statutory and mandatory requirements

Occupational Responsibilities:

Fault find and repair electrical control systems and electrical installations

Occupational Contexts:

i) Maintenance processes for equipment, control systems and electrical installations

SECTION 3: CURRICULUM COMPONENT SPECIFICATIONS

SECTION 3A: KNOWLEDGE MODULE SPECIFICATIONS

List of Knowledge Modules for which Specifications are included

- Å 671101000-KM-01: Health, Safety, Quality and Legislation (NQF Level: 4) Credits: 5
- Å 671101000-KM-02: Tools, Equipment and Materials (NQF Level: 4) Credits: 8
- Å 671101000-KM-03: Electricity and electronics (NQF Level: 4) Credits: 13
- Å 671101000-KM-04: Industry Context (NQF Level: 3) Credits: 2
- Å 671101000-KM-05: Wire ways and wiring (NQF Level: 4) Credits: 11
- Å 671101000-KM-06: Rotating electrical machinery (NQF Level: 4) Credits: 13
- Å 671101000-KM-07: Electrical supply systems and components (NQF Level: 4) Credits: 31
- Å 671101000-KM-08: Low Voltage protection (NQF Level: 4) Credits: 5-
- Å 671101000-KM-9: Fault Finding (NQF Level: 4) Credits: 3

671101000-KM-01: Health, Safety, Quality and Legislation, L4, Cr 5

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the health, safety and other legislative requirements for the practise of an Electrician.

The learning will enable learners to demonstrating an understanding of:

KM-01-KT01: Safety, health, environment, risk and quality principles in the workplace (100%)

1.2 Guidelines for Topics

1.2.1 KM-01-KT01: Safety, health, environment, risk and quality principles in the workplace (100%)

Topic elements to be covered include:

KT0201 Legislation and regulations for workplace safety within electricity
KT0202 Occupation health and safety legislation
KT0203 Safety precautions and safe practices for working within industry
KT0204 Personal protective equipment
KT0205 Safety symbols and colour coding
KT0206 Fundamentals of isolating and locking out equipment and circuits
KT0207 Fundamentals of securing worksites
KT0208 Protection devices
KT0209 Causes, prevention and control of fires
KT0210 Hazard identification and risk principles
KT0211 Environmental, protection and pollution concepts
KT0212 Basic first Aid
KT0213 Incident reporting.
KT0214 Evacuation procedures.

Internal Assessment Criteria and Weight

Describe and explain the application of legislation for working with electrical installations, equipment and appliances

Various types of personal protective equipment are identified and their uses are explained

Describe and explain the difference between acts and regulations, the responsibilities of the various role players and the application of the relevant health and safety regulations in the workplace.

Safety signs are identified and described in terms of associated risk and safe conduct

The inter-relationship between workplace safety and a productive work environment is explained

The types of hazardous waste is identified and the impact of incorrectly disposing of waste is described.

Environmental regulations for the disposal of relevant hazardous waste is described

Regulations for the prevention and control of fires and the causes, effect and implication of fires are described

The attributes, characteristics, descriptions and properties of different types of fires are explained.

Basic first aid procedures are described for the attributes, characteristics and properties of various injuries.

The implication of injuries, their causes and effects are explained.

Basic risk assessment and hazard identification procedures are described

(Weight 100%)

1.3 Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Classroom furniture (chairs and tables, audio equipment and all other equipment conducive to a learning environment)
- Handouts and stationery (electronic consumables, pencils/paper)
- Electrical learning material

Human Resource Requirements:

- Facilitator/learner ratio 1 to 24
- Relevant qualifications/experience

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements

1.4 Critical Topics to be Assessed Externally for the Knowledge Module

None

1.5 Exemptions

None

671101000-KM-02: Tools, Equipment and Materials, L4, Cr 8

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the theory required for the use of hand tools, power tools and measuring and testing instruments to practise as an Electrician.

The learning will enable learners to demonstrating an understanding of:
KM-02-KT01: Hand tools and power tools (5%)
KM-02-KT02: Measuring and testing instruments (50%)

1.2 Guidelines for Topics

1.2.1 KM-02-KT01: Hand tools and power tools (50%)

Topic elements to be covered include:

KT0101 Types, uses and care of hand tools
KT0102 Types, uses and care of portable power tools
KT0103 Types, uses and care of fixed power tools

Internal Assessment Criteria and Weight

Identify hand tools and describe their uses
Identify portable power tools and describe their uses
Identify fixed power tools and describe their uses
(Weight 50%)

1.2.2 KM-02-KT02: Measuring and testing instruments (50%)

Topic elements to be covered include:

KT0201 Portable electrical measuring instruments
KT0202 Types of electrical measuring and testing instruments
KT0203 Safe use of measuring and testing instruments
KT0204 Construction and operating principles of measuring and testing instruments
KT0205 Methods of connecting measuring and testing instruments in circuits
KT0206 Applications and methods of using electrical measuring and testing instruments
KT0207 Care and maintenance of single and three phase measuring and testing instruments
KT0208 Instrument transformers
KT0209 Types and functions of panel mounted electrical measuring and testing instruments

KT0210 Safe use of panel mounted measuring and test instruments

KT0211 Protection of measuring instruments when connected in a circuit.

Internal Assessment Criteria and Weight

Identify different types of electrical measuring instruments including fixed and portable and state the purpose.

Identify the basic components of various measuring and test instruments and describe the basic principle of operation.

Explain by means of circuit diagrams how a ammeter, voltmeter is directly connected and indirectly connected by using instrument transformers.

Describe the applications and methods of using electrical measuring and testing instruments in direct and alternating current circuits.

Describe safety and functionality checks to be performed on measuring and testing instruments before use

Describe correct methods of handling and storing measuring and testing instruments

Describe, with the aid of drawings, the connection of measuring instruments to single phase and three phase circuits

Explain the function of the wattmeter (electrodynamometer type), kilowatt-hour meter, frequency meter, power factor meter and maximum demand meter

Illustrate, by means of circuit diagrams, how the wattmeter (electrodynamometer type), kilowatt-hour meter, frequency meter, power factor meter and maximum demand meter are connected in single and three phase circuits:

Describe the various methods of protection when connecting measuring instruments in circuits

(Weight 50%)

1.3 Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Classroom furniture (chairs and tables, audio equipment and all other equipment conducive to a learning environment)
- Handouts and stationery (electronic consumables, pencils/paper)
- Electrical learning material

Human Resource Requirements:

- Facilitator/learner ratio 1 to 24
- Relevant qualifications/experience

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements

1.4 Critical Topics to be Assessed Externally for the Knowledge Module

None

1.5 Exemptions

None

671101000-KM-03: Electricity and Electronics, L4, Cr 13

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the theory of electricity and electronics required to practise as an Electrician.

The learning will enable learners to demonstrating an understanding of:
KM-03-KT01: Fundamentals of electricity (35%)
KM-03-KT02: Electronics (30%)
KM-03-KT03: Electrical principles of appliances (35%)

1.2 Guidelines for Topics

1.2.1 KM-03-KT01: Fundamentals of electricity (35%)

***Topic elements to be covered include**:*

KT0101 Principles and fundamental concepts of electricity
KT0102 Definitions, types, properties and applications of conductors, insulators and semi-conductors
KT0103 Concepts, theories and principles of Electrical Circuits
KT0104 Calculations on basic electrical circuits (resistance, voltage and current) and power
KT0105 Basic principles and calculation of magnetism

Internal Assessment Criteria and Weight

Describe, calculate and interpret fundamental concepts of electricity (Electro motive force, Potential difference, Resistance)using the correct units of measurement and definitions.
List types of materials used for conductors, insulators and semi-conductors and describe their mechanical and electrical properties and applications.
Describe the factors that influences the resistance of a material
Define and explain, using the correct units of measurement ohms law of electricity
Define and explain using the correct units of measurement Kirchoffôs law of electricity
Manipulate formula to calculate voltage, current and resistance in series/parallel circuits
Name, describe and explain the different types of magnets and their properties
Explain fundamental magnetic concepts by naming the five charicteristics of magnetic lines of force and explaining the relationship between flux and flux density

Describe, with the aid of a drawing, the application of the right-hand grip rule and show how a magnetic field is established when an electrical current flows through a conductor, by using formula, calculate the force on a current carrying conductor.

Describe, with the aid of drawings, the effect on the magnetic field around a current carrying conductor when placed in a uniform magnetic field. Fleming's left-hand rule must be demonstrated.

Describe and explain the various forces or methods that can be used to alter magnetic fields, and describe the changes that take place

(Weight 35%)

1.2.2 KM-03-KT02: Electronics (30%)

Topic elements to be covered include:

KT0201 International Electrotechnical Commission (IEC) symbols for electronic components

KT0202 Principles,safety precautions, identification and basic function of electronic components

KT0203 Basic electronic circuits

KT0204 Principles of rectification, single phase and 3-phase

Internal Assessment Criteria and Weight

Describe the various capacitors used and typical applications

Determine the value of capacitors using charts and calculate the value of capacitance of capacitors in series and parallel

Determine the value of resistors utilizing colour coding charts

Describe the various inductors used and typical applications

Describe the construction and uses of various semiconductor devices

Draw basic electronic circuits using International Electrotechnical Commission (IEC) symbols

(Weight 30%)

1.2.3 KM-03-KT03: Earthing and bonding (35%)

Topic elements to be covered include:

KT0301 Principles of earthing and bonding

KT0302 Methods of earthing and bonding on low voltage overhead lines, equipment and cables.

KT0303 Regulatory and statutory requirements related to earthing and bonding

Internal Assessment Criteria and Weight

Define earthing and bonding and explain the purpose thereof

Explain the regulatory requirements for earthing and bonding

Explain the regulatory requirements for the earthing of neutral conductors on both the supplier and consumer side of an installation

Explain the term 'systems earthing'

Describe the earthing systems relevant to SANS 10142-1.

Describe how a common earth electrode is used in reticulation circuits

Describe the provision of earthing for underground cables and overhead lines

Explain the various processes of measuring, testing and calculating earthing and bonding system values.

(Weight 35%)

1.3 Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Classroom furniture (chairs and tables, audio equipment and all other equipment conducive to a learning environment)
- Handouts and stationery (electronic consumables, pencils/paper)
- Electrical learning material

Human Resource Requirements:

- Facilitator/learner ratio 1 to 24
- Relevant qualifications/experience

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements

1.4 Critical Topics to be Assessed Externally for the Knowledge Module

None

1.5 Exemptions

None

671101000-KM-04: Industry Context, L3, Cr 2

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the industry context to practise as an Electrician.

The learning will enable learners to demonstrating an understanding of:
KM-04-KT01: Introduction to the world of work and the electrical trade (100%)

1.2 Guidelines for Topics

1.2.1 KM-04-KT01: Introduction to the world of work and the electrical trade (100%)

Topic elements to be covered include:

KT0101 The Electricians world of work
KT0102 Career opportunities of qualified Electricians
KT0103 The Electricians responsibilities and duties
KT0104 Legislation relating to apprentices in the Electrical trade
KT0105 Trade test requirements

Internal Assessment Criteria and Weight

The job environment and workplace roles of a Electrician are accurately described and explained
The profile of a Electrician is described with respect to industry descriptions, carreer path progression and requirements
Legal aspects that includes the employment contract and roles and responsibilities of the employer and employee are explained
The use of applicable legislation relating to the electrical trade is described
Trade test methodology, requirements and assessment procedure leading up to the trade assessment are explained
(Weight 100%)

1.3 Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Classroom furniture (chairs and tables, audio equipment and all other equipment conducive to a learning environment)
- Handouts and stationery (electronic consumables, pencils/paper)

- Electrical learning material

Human Resource Requirements:

- Facilitator/learner ratio 1 to 24
- Relevant qualifications/experience

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements

1.4 Critical Topics to be Assessed Externally for the Knowledge Module

None

1.5 Exemptions

None

671101000-KM-05: Wire ways and wiring, L4, Cr 11

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the theory of wire ways and wiring required for the practise as an Electrician.

The learning will enable learners to demonstrating an understanding of:
KM-05-KT01: Wire ways (35%)
KM-05-KT02: Wiring of installations (35%)
KM-05-KT03: Earthing and bonding (30%)

1.2 Guidelines for Topics

1.2.1 KM-05-KT01: Wire ways (35%)

Topic elements to be covered include:

KT0101 Definition, types, purpose and applications of wireways
KT0102 General provisions for wireways as prescribed in the SANS 10142-1

Internal Assessment Criteria and Weight

Define the term wireway as given in the SANS 10142-1 Code of Practice
Describe different types of wireways and their applications
Describe and explain the provisions in the SANS 10142-1 Code of Practice for the correct and safe installation and use of the various types of wireways
Describe factors that influences the selection of wireways

(Weight 35%)

1.2.2 KM-05-KT02: Wiring of installations (35%)

Topic elements to be covered include:

KT0201 Regulations and statutory requirements for wiring of premises
KT0202 Electrical diagrams and symbols
KT0203 Electrical components and their applications

Internal Assessment Criteria and Weight

List, identify and explain the meaning of all standard International Electrotechnical Commission (IEC) wiring symbols given on work drawings

Identify electrical components and draw schematic diagrams of installations

State and explain the safety purpose of earthing, fuse, circuit breakers and earth leakage protection unit

Describe the principles of operation of various control systems

Describe the principles of operation of single and three phase circuit breakers and core balance earth leakage relays (wound primaries and straight primaries with tripping relay)

Describe the purpose of load distribution, lightning arrestors and energy control units.

(Weight 35%)

1.2.3 KM-05-KT03: Earthing and bonding (30%)

Topic elements to be covered include:

KT0301 Principles of earthing and bonding

KT0302 Methods of earthing and bonding on low voltage overhead lines, equipment and cables.

KT0303 Regulatory and statutory requirements related to earthing and bonding

Internal Assessment Criteria and Weight

Define earthing and bonding and explain the purpose thereof

Explain the regulatory requirements for earthing and bonding

Explain the regulatory requirements for the earthing of neutral conductors on both the supplier and consumer side of an installation

Explain the term 'systems earthing'

Describe the earthing systems relevant to SANS 10142-1.

Describe how a common earth electrode is used in reticulation circuits

Describe the provision of earthing for underground cables and overhead lines

Explain the various processes of measuring, testing and calculating earthing and bonding system values.

(Weight 30%)

1.3 Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Classroom furniture (chairs and tables, audio equipment and all other equipment conducive to a learning environment)
- Handouts and stationery (electronic consumables, pencils/paper)
- Electrical learning material

Human Resource Requirements:

- Facilitator/learner ratio 1 to 24
- Relevant qualifications/experience

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements

1.4 Critical Topics to be Assessed Externally for the Knowledge Module

None

1.5 Exemptions

None

671101000-KM-06: Rotating electrical machinery, L4, Cr 13

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the theory of rotating electrical machinery required for the practise as an Electrician.

The learning will enable learners to demonstrating an understanding of:
KM-06-KT01: Rotating electrical machinery - AC motors (35%)
KM-06-KT02: Rotating Electrical Machinery - DC motors (35%)
KM-06-KT03: Rotating electrical machinery - Alternators and Generators (30%)

1.2 Guidelines for Topics

1.2.1 KM-06-KT01: Rotating electrical machinery - AC motors (35%)

Topic elements to be covered include:

KT0101 Construction of alternating current motors
KT0102 Principle of operation of alternating current motors
KT0103 Configuration of motor connections
KT0104 Types of single phase and three phase alternating current motors
KT0105 Application of alternating current motors
KT0106 Testing principles of single phase and three phase alternating current motors
KT0107 Protection of motors
KT0108 Calculation of motor properties

Internal Assessment Criteria and Weight

List the different types of alternating current motors and describe their construction
Explain the principle of operation of alternating current motors
Characteristics of single phase and three phase motors
Describe and explain how tests are conducted on alternating current motors
Describe with the aid of diagrams, the configuration of motor connections
Describe and explain protection devices used for alternating current motors
Explain how time delay and current rating of overload protection devices influence their use in protecting motors from damage in case of locked rotors, overload during operation and short circuits.
Compare the advantages and disadvantages of single- and three-phase motors
Calculate alternating current motor properties

(Weight 35%)

1.2.2 KM-06-KT02: Rotating Electrical Machinery - DC motors (35%)

Topic elements to be covered include:

KT0201 Construction of direct current motors
KT0202 Principles of operation for direct current motors
KT0203 Configuration of direct current motor connections
KT0204 Types and application of direct current motors
KT0205 Testing principles of direct current motors
KT0206 Protection of direct current motors
KT0207 Calculation of direct current motor properties

Internal Assessment Criteria and Weight

List the different types of direct current motors and describe their construction
Explain the principle of operation of direct current motors
Describe the applications of different types of direct current motors
Describe and explain how various tests are conducted on direct current motors
Describe with the aid of diagrams, the configuration of motor connections, power circuits and control circuits.
Describe and explain protection devices used for direct current motors
Explain how time delay and current rating of overload protection devices influence their use in protecting motors from damage in case of locked rotors, overload during operation, short circuits.
Compare the advantages and disadvantages of different types of direct current motors
Calculate direct current motor properties
(Weight 35%)

1.2.3 KM-06-KT03: Rotating electrical machinery - Alternators and Generators (30%)

Topic elements to be covered include:

KT0301 Construction of alternators and generators
KT0302 Principle of operation of alternators and generators
KT0303 Configuration of alternator and generator connections
KT0304 Types and application of alternators and generators
KT0305 Testing principles of alternators and generators
KT0306 Protection of alternators and generators
KT0307 Calculate properties of alternators and generators

Internal Assessment Criteria and Weight

List the different types of alternators and generators and describe their construction
Explain the principle of operation of alternators and generators
Explain the fundamental differences between alternators and generators
Describe the applications of different types of alternators and generators
Describe and explain how tests are conducted on alternators and generators
Describe with the aid of diagrams, the configuration of alternator and generator connections, power circuits and control circuits.
Describe and explain protection devices used for alternators and generators
Explain how time delay and current rating of overload protection devices influence their use in protecting alternators and generators from damage in the case of locked rotors, overload during operation and short circuits.

(Weight 30%)

1.3 Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Classroom furniture (chairs and tables, audio equipment and all other equipment conducive to a learning environment)
- Handouts and stationery (electronic consumables, pencils/paper)
- Electrical learning material

Human Resource Requirements:

- Facilitator/learner ratio 1 to 24
- Relevant qualifications/experience

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements

1.4 Critical Topics to be Assessed Externally for the Knowledge Module

None

1.5 Exemptions

None

671101000-KM-07: Electrical supply systems and components, L4, Cr 31

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the theory of electrical supply systems and components required to practise as an Electrician.

The learning will enable learners to demonstrating an understanding of:

KM-07-KT01: Concepts, theories and principles of supply Systems (20%)

KM-07-KT02: Batteries (10%)

KM-07-KT03: Transformers (20%)

KM-07-KT04: Types of cables and applications (20%)

KM-07-KT05: Switchgear and control gear (20%)

KM-07-KT06: Lighting systems (10%)

1.2 Guidelines for Topics

1.2.1 KM-07-KT01: Concepts, theories and principles of supply Systems (20%)

Topic elements to be covered include:

KT0101	Theories and concepts of alternating current
KT0102	Fundamental principles of alternating current
KT0103	Alternating current generation (distribution systems theory)
KT0104	Characteristics and calculations from alternating current waveforms
KT0105	Theories, concepts and principles of direct current sources
KT0106	Sources of direct current
KT0107	Calculations of direct and alternating current circuits
KT0108	Construction and operating priciples of direct current generators
KT0109	Charicteristics, sources and generation of renewable energy
KT0110	Relevant leglisative requiments

Internal Assessment Criteria and Weight

Explain the principles of generation by using Fleming's right hand rule and Faraday's laws

Explain the generation and differences between single and three phase alternating current by using wave forms and vector diagrams.

Explain the load balancing principles in a three phase supply system.

Explain by drawing wave form diagrams, the differences between line and phase values.

Calculate line and phase voltages, line and phase currents, power and power factor taking inductance, capacitance and impedance into account

Explain the generation principles of direct current.

Calculate power and energy in direct and alternating current circuits

Explain the various methods of producing renewable energy and list the advantages and disadvantages of the different renewable energy generation methods.

Describe with the aid of drawings the components of direct current generators and their functions.

Explain with the aid of drawings the operating principles of direct current generators.

(Weight 20%)

1.2.2 KM-07-KT02: Batteries (10%)

Topic elements to be covered include:

KT0201 Fundementals of battery operation

KT0202 Types and classification of batteries

KT0203 Safety precautions of batteries

KT0204 Care and maintenance of batteries

KT0205 Battery components and construction

KT0206 Disposal of batteries

Internal Assessment Criteria and Weight

Explain the terms potential difference, electromotive force, relative density and capacity

Describe, with the aid of a diagram, the fundamentals of battery construction

Describe and explain the various types of batteries and cells

Describe the advantages and disadvantages of primary and secondary cells for particular applications

Describe and explain the correct procedures to care, maintain, store and dispose of batteries and the hazards and safety precautions associated with batteries and battery rooms

Name the instruments used for testing batteries, describe how they are used and explain the purpose of each test

Explain, with the aid of drawings, the discharging and charging action of lead-acid cells

(Weight 10%)

1.2.3 KM-07-KT03: Transformers (20%)

Topic elements to be covered include:

KT0301 Theories of single phase wound transformers

KT0302 Types of single phase transformers including single wound, double wound and auto-transformers and their applications.

KT0303 Fundamentals of transformer construction

KT0704 Transformer cooling systems

KT0305 Principles of single phase transformer operation

KT0306 Principles of single phase auto-transformer operation

KT0307 Transformer losses

KT0308 Formulas and calculations on input and output of transformers

KT0709 Maintenance requirements of transformers

KT0310 Types of three phase transformers and their applications

KT0311 Construction of three phase transformers including open core, closed core and shell or divided core

KT0312 Principles of 3 phase transformer operation and configuration

KT0313 Principles of 3 phase auto transformer operation and configuration

KT0314 Transformer protection and phasing

Internal Assessment Criteria and Weight

Name and describe the types of single phase transformers

Describe, with the aid of drawings, the construction of single phase transformers

Describe and explain the cooling systems used on transformers

Describe, with the aid of drawings, the principle of operation of single phase transformers in terms of mutual inductance and the henry as the unit of inductance

Explain, with the aid of drawings, the principle of operation of single phase auto-transformers

Describe types of transformer losses and explain their causes and effects

Calculate the terminal voltage, turns and current ratios for an single phase transformer.

Describe and explain the maintenance requirements for single/three phase transformers

Describe, with the aid of diagrams, the construction of three phase transformers

Describe the various types of construction of three phase transformers - open core, closed core, and shell or divided core

Describe the basic transformer maintenance procedures

Calculate the relationship of the voltage, current, turns ratios and power including true power, apparent power and power factor.

Describe and explain how inductance causes a phase angle between voltage and current and its relationship with the concept 'power factor'

Describe, with the aid of diagrams, three phase transformer connections

Calculate the line and phase voltages and currents relating to three-phase transformer connections

Explain the concept of, and need for, transformer tappings

Explain transformer protection and phasing

(Weight 20%)

1.2.4 KM-07-KT04: Types of cables and applications (20%)

Topic elements to be covered include:

KT0401 Types of cable construction including armoured and un-armoured, insulated and un-insulated, single and multi core cables.

KT0402 Cable materials and their functions and characteristics

KT0403 Identification of cable characteristics and properties

KT0404 Applications of various types of cable

KT0405 Installation methods and safe use of cables

KT0406 Safe transport and storage of cables

Internal Assessment Criteria and Weight

Describe, with the aid of sketches, the different types of cables and their construction, and explain the function of the various materials used

Describe the characteristics and applications of the various types of cables and compare their advantages and disadvantages.

Describe the factors effecting the effeciency of cables

Describe and explain the provisions in the SANS 10142-1 Code of Practice for the correct and safe installation and use of the various types of cables.

Describe the precautions required when transporting and storing cables

(Weight 20%)

1.2.5 KM-07-KT05: Switchgear and control gear (20%)

Topic elements to be covered include:

KT0501 Principles of operation of switchgear and control gear

KT0502 Components of switchgear and control gear systems and the application thereof.

KT0503 Electrical drawings

KT0504 Introduction to Programmable Logic Controllers (PLCõs)

KT0505 Introduction to Soft starters

KT0506 Introduction to Variable speed drives

Internal Assessment Criteria and Weight

Describe disconnectors, relays, timers and contactors in terms of construction and operating principles with reference to the contacts, operating coils (where applicable) and operating mechanisms

Describe, with the aid of labelled drawings, the principle of operation of the over current and earth leakage protection relays

Describe the following terminology in terms of low voltage circuit breakers: moulded cases, positive indication, trip position, factory sealed, thermal magnetic tripping, quick make, quick break, trip free mechanism, interpole barriers.

Describe the basic principles of operation for programmable logic controllers

Describe the basic principles of operation for soft starters

Describe the basic principles of operation for variable speed drives

(Weight 20%)

1.2.6 KM-07-KT06: Lighting systems (10%)

Topic elements to be covered include*:*

KT0601 Principles of Illumination

KT0602 Types of luminaries and lighting systems

Internal Assessment Criteria and Weight

List the different types of alternating current motors and describe their construction

Explain the principle of operation of alternating current motors

Characteristics of single phase and three phase motors

Describe and explain how tests are conducted on alternating current motors

Describe with the aid of diagrams, the configuration of motor connections

Describe and explain protection devices used for alternating current motors

Explain how time delay and current rating of overload protection devices influence their use in protecting motors from damage in case of locked rotors, overload during operation and short circuits.

Compare the advantages and disadvantages of single- and three-phase motors

Calculate alternating current motor properties

(Weight 10%)

1.3 Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Classroom furniture (chairs and tables, audio equipment and all other equipment conducive to a learning environment)
- Handouts and stationery (electronic consumables, pencils/paper)
- Electrical learning material

Human Resource Requirements:

- Facilitator/learner ratio 1 to 24
- Relevant qualifications/experience

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements

1.4 Critical Topics to be Assessed Externally for the Knowledge Module

None

1.5 Exemptions

None

671101000-KM-08: Low Voltage protection, L4, Cr5

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the theory of low voltage protection required to practise as an Electrician.

The learning will enable learners to demonstrating an understanding of:
KM-08-KT01: Low voltage protection (100%)

1.2 Guidelines for Topics

1.2.1 KM-08-KT01: Low voltage protection (100%)

Topic elements to be covered include:

KT0101 Purpose and application of low voltage protection
KT0102 Types of low voltage protection
KT0103 Low voltage protection parameters and statutory requirements

Internal Assessment Criteria and Weight

Name and describe the types of low voltage protective devices
Describe the operation and functions of different types of low voltage protective devices including overload relays, fuses, circuit breakers and earth leakage protection devices.
Explain, with the aid of circuit diagrams, how single-and three phase electrical installations are protected.
Describe the effect of adverse conditions on the operational characteristics of protective devices
(Weight 100%)

1.3 Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Classroom furniture (chairs and tables, audio equipment and all other equipment conducive to a learning environment)
- Handouts and stationery (electronic consumables, pencils/paper)
- Electrical learning material

Human Resource Requirements:

- Facilitator/learner ratio 1 to 24

- Relevant qualifications/experience

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements

1.4 Critical Topics to be Assessed Externally for the Knowledge Module

None

1.5 Exemptions

None

671101000-KM-9: Fault Finding, L4, Cr 3

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the theory of fault finding required to practise as an Electrician.

The learning will enable learners to demonstrating an understanding of:
KM-09-KT01: Fault finding (5%)

1.2 Guidelines for Topics

1.2.1 KM-09-KT01: Fault finding (100%)

Topic elements to be covered include:

KT0101 Faultfinding principles for electrical circuits
KT0102 Faultfinding techniques for electrical circuits
KT0103 Safety during faultfinding

Internal Assessment Criteria and Weight

Explain fault finding principles and techniques for alternating and direct current main supply circuits
Explain fault finding principles and techniques for alternating and direct current control circuits

(Weight 100%)

1.3 Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Classroom furniture (chairs and tables, audio equipment and all other equipment conducive to a learning environment)
- Handouts and stationery (electronic consumables, pencils/paper)
- Electrical learning material

Human Resource Requirements:

- Facilitator/learner ratio 1 to 24
- Relevant qualifications/experience

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements

1.4 Critical Topics to be Assessed Externally for the Knowledge Module

None

1.5 Exemptions

None

SECTION 3B: PRACTICAL SKILL MODULE SPECIFICATIONS

List of Practical Skill Module Specifications

- 671101000-PM-01 Use hand, power and measuring tools,L3,Cr28
- 671101000-PS-02 Plan worksite set up for installing, wiring and connecting electrical equipment and control systems,L3, Cr5
- 671101000-PS-03 Prepare worksite set up for installing, wiring and connecting electrical equipment and control systems,L3,Cr3
- 671101000-PS-04 Install wire-ways,L4, Cr5
- 671101000-PS-05 Install, wire and connect electrical equipment and control systems, L4,Cr38
- 671101000-PS-06 Conduct pre-commission inspection (power off) and test new and existing installations, L4,Cr5
- 671101000-PS-07 Carry out commissioning tests,L4,Cr13
- 671101000-PS-08 Fault find and repair electrical control systems and electrical installations, L4, Cr22

1 671101000-PM-01, 671101000-PM-01, Use hand, power and measuring tools, L3, Cr28

1.1 Purpose of the Practical Skill Module

The focus of the learning in this module is on providing the learner an opportunity to: Practice electrical skills within a simulated work environment. The learners will be practicing skills related to preparing and using of hand, power and measuring tools.

The learner will be required to:

PM-01-PS01: Select, use and care of engineering hand tools

PM-01-PS02: Select, use and care for power tools

PM-01-PS03: Select, use and care for electrical measuring instruments

PM-01-PS04: Perform soldering activities

PM-01-PS05: Carry out basic electric arc welding in an electrical environment

PM-01-PS06: Carry out basic gas cutting in an electrical environment

1.2 Guidelines for Practical Skills

1.2.1 PM-01-PS01: Select, use and care of engineering hand tools

Scope of Practical Skill

Given work instructions, checklists, work area, drawings, documents, templates, forms, safety and quality principles, hand saws, hammers, screw drivers, sockets, spanners, chassis punches, side cutters, pliers, wire strippers, drill bits, measuring and marking off tools, fastening tools, standard operating procedures and, statutory requirements, the learner should be able to:

PA0101 Select engineering hand tools for serviceability.

PA0102 Use engineering hand tools.

PA0103 Care for engineering hand tools.

Applied Knowledge

AK0101 Workshop procedures including housekeeping practices according to statutory requirements.

AK0102 Techniques of maintaining hand tools

AK0103 Techniques to correctly store hand tools

Internal Assessment Criteria

Unsafe and faulty tools were identified and marked for repair/maintenance or replacement according to set procedures

The correct application of tools were used to measure and mark out steel, copper, aluminium, wood, plastics and synthetic materials.

The correct application of tools were used for cutting steel, copper, aluminium, wood, plastics and synthetic materials as per manufacturers specifications.

The correct application of tools was used to loosen or fasten a range of different types and sizes of nuts or bolts and different types and sizes of screws as per manufacturer's specifications.

The correct application of tools was used to strip or cut a range of different types and sizes of electrical wire as per manufacturerõs specifications.

Sharp edges on chisel/punch type tool heads with "mushroom effect" were removed to ensure that they can be used safely; then tips with burs or chips are sharpened for effective use.

Flat Screw driver tips with burs or chips were filed and prepared to a manufacturer's specification ensuring that they are serviceable

The adjusting/moving mechanisms of shifting spanners, gas pump pliers, vice grip, dividers, crimping tools, stilson wrench were lubricated to ensure free movement and serviceability.

Engineering files cutting edge were cleaned using a wire brush to ensure serviceability.

Scribers, dividers and centre punches were sharpened to ensure serviceability.

1.2.2 PM-01-PS02: Select, use and care for power tools

Scope of Practical Skill

Given work instructions, work area, documents, templates, drilling machines, grinders, and saws standard operating procedures and, statutory requirements, the learner should be able to:

PA0201 Select a power tool pertaining to specific job requirements.

PA0202 Use fixed power tools.

PA0203 Use portable power tools.

PA0204 Care for and store power tools and their accessories.

Applied Knowledge

AK0201 Workshop procedures including housekeeping practices according to statutory requirements.

AK0202 Safety practices relating to the use of power tools including the use of personal protective equipment, electrical and fire protection

AK0203 Types and uses of fixed and portable power tools

Internal Assessment Criteria

Power tools were selected according to the task requirements.

Pre-operational check was carried out in terms of safety requirements and function.

Hazards associated with the use of power tools were recognised and necessary precautions taken according to workshop procedures.

Faulty and unsafe tools were identified and reported in accordance with standard operating procedures

Personal safety equipment was selected and used according to tool requirement.

Fixed and portable power tools were selected and set up according to job requirements.

All guards and securing mechanisms were effectively utilised in terms of job requirements.

Fixed and portable power tools were used safely and in accordance with manufacturerôs specifications.

Power tools were inspected, cleaned and lubricated after use according to workshop practices and/or manufactures specifications.

Loose items were secured and minor defects repaired in accordance to workshop procedures.

Portable power tools and accessories were stored in accordance to workshop procedures.

1.2.3 PM-01-PS03: Select, use and care for electrical measuring instruments

Scope of Practical Skill

Given work instructions, work area, documents, multimeter (ohms, volts, amp`s), insulation tester, clip on ammeter, earth leakage polarity tester, oscilloscope standard operating procedures and, statutory requirements the learner should be able to:

PA0301 Identify and select portable electrical measuring instruments.

PA0302 Use and interpret portable electrical measuring instrument readings.

PA0303 Care for portable electrical measuring instruments.

Applied Knowledge

AK0301 Handling procedures related to portable measuring instrument.

AK0302 Basic operating principles of portable electrical measuring instruments.

AK0303 Types, applications and functions of portable electrical measuring instruments.

Internal Assessment Criteria

Job instructions were interpreted correctly and sequence of operation is determined.

Portable electrical measuring instruments were correctly selected according to workshop procedures and to meet safety and job requirements

Unsafe and faulty measuring instruments were identified visually and marked for repair or replacement.

Portable measuring instruments were read correctly and voltage, amperage, and resistance

readings were recorded as per workshop procedures.
Portable electrical equipment was checked for correct operation and functionality.
Measuring instruments were correctly set up for application.
Results were recorded on appropriate documentation.
Results were accurately interpreted against the specifications of the job requirements.
Electrical measuring instruments were used in accordance with their specifications.
Electrical measuring instruments were placed and stored in accordance with manufactures specifications and workshop standards.

1.2.4 PM-01-PS04: Perform soldering activities

Scope of Practical Skill

Given work instructions, work area, checklists, soldering wire, soldering iron/stations, solder sucker, accessories, standard operating procedures and statutory requirements the learner should be able to:

PA0401 Solider various wire joints
PA0402 Solder components on a PC or Vero board
PA0403 De-solder components

Applied Knowledge

AK0401 Soldering techniques and applications
AK0402 Safety practices relating to the use of soldering equipment including the use of personal protective equipment.
AK0403 De-soldering methods

Internal Assessment Criteria

Work area was inspected for safe working conditions and corrective action is taken where required.
Applicable soldering equipment was selected as required by task.
Soldering material was correctly selected as required by the task.
All connections were cleaned from any dirt or oxidation.
Tinning of wire and connections was done according to manufacturer's specifications.
Connections were soldered according to set specifications and techniques.
Components were laid out on the circuit board according to the circuit diagram.
Components were soldered according to soldering techniques.

1.2.5 PM-01-PS05: Carry out basic electric arc welding in an electrical environment

Scope of Practical Skill

Given work instructions, work area, documents, portable electric arc welding machines, welding cables., electrode holder, earth clamp, chipping hammer, electrodes (welding rods), metal surface cleaning materials (files, wire brush, emery cloth, rags), Arc welding helmets, welding screens, leather gloves , aprons and *standard operating procedures and statutory requirements the learner should be able to*:

PA0501 Prepare the electric arc welding equipment for the task.

PA0502 Prepare the metal surfaces for electric arc welding.

PA0503 Apply basic electric arc welding techniques.

Applied Knowledge

AK0501 Names, applications and functions of electric arc welding machines and equipment.

AK0502 Handling procedures related to electric arc welding equipment.

AK0503 Application of various types of electrodes and current settings during the electric arc welding process.

AK0504 Safe work procedures and workshop practices.

AK0505 Workshop procedures including housekeeping practices according to statutory requirements.

Internal Assessment Criteria

The applicable safety equipment was obtained and inspected as per safe work procedures and statutory requirements.

The electric arc welding equipment was set up and cable connections checked for tightness to ensure effective operation as per safe work procedures.

The cleaning materials for preparing the metal surfaces to be welded were correctly applied as per task requirements.

The appropriate personal protective equipment was worn as per safe work procedures.

The edges of the metals welded were correctly bevelled where needed as per specific task requirements.

The contact surfaces of the earth clamp, metals earthed and the electrode holder were cleaned thoroughly to ensure proper current flow during the welding process.

The required current setting on the welding machine was correctly selected for electric arc welding according to application requirements.

The joining of metals by means of electric arc welding was carried out and correct electrode positioning and movement are demonstrated according to application requirements.

Hot metal surfaces were allowed to cool down and all slag removed from the welding joints as per safe work procedures.

Electric arc welding machine, equipment and materials were correctly stored as per

applicable safety standards.
The work area was cleaned and waste materials disposed of, according to local housekeeping standards.
Safety equipment was cleaned and stored according to statutory requirements.

1.2.6 PM-01-PS06: Carry out basic gas cutting in an electrical environment

Scope of Practical Skill

Given work instructions, work area, documents, Oxygen-and acetylene gas cylinders and keys, gas regulators and flashback arrestors, rubber gas hoses and clamps, cutting torches and nozzles, nozzle cleaning equipment, spark lighter, , metal surface cleaning materials (wire brush, emery cloth, chemicals), gas welding goggles, leather aprons and boot protectors, safety gloves and overalls the learner should be able to:

PA0601 Prepare for gas cutting.

PA0602 Apply basic gas cutting process.

Applied Knowledge

AK0601 Names, applications and functions of gas cutting equipment.

AK0602 Handling procedures related to gas cutting equipment.

AK0604 Safe work procedures and workshop practices.

AK0605 Workshop procedures including housekeeping practices according to statutory requirements.

Internal Assessment Criteria

The applicable safety equipment was obtained and inspected as per safe work procedures and statutory requirements.
The gas cutting equipment was set up and checked for gas leaks and correct cylinder pressures according to safe work procedures and industry requirements.
The relevant cutting material is limited to mild steel only (maximum thickness of 6mm), required for the task was ensured to be ready and available, and nozzles were selected correctly to match the application.
The gas cylinders were handled safely as per safe work procedures and industry requirements.
Safety and proper workplace practices were maintained at all times.
The oxygen and acetylene gas pressures on the regulator were correctly set for gas cutting according to application requirements.
The gas torch was lit up in the correct sequence and the gas mixture set as per safe work procedures and industry requirements.

The metal was cut with the gas cutting torch and the correct nozzle position- and movement was demonstrated according to application requirements.
Hot metal surfaces were allowed to cool down as per safe work procedures.
Gas cylinder valves were closed and gas pressure in the hoses released as per safe work procedures.
Gas cutting equipment and materials were correctly stored as per applicable safety standards.
The work area was cleaned and waste materials disposed of according to local housekeeping standards.

1.3 Provider Accreditation Requirements for the Module

Physical Requirements:

Demonstrate access to:

- Electrical environment
- categories of tools, equipment and processes in order for learners to be able to plan worksite set up for installing, wiring and connecting electrical equipment and control systems
- Material include mild steel of 3mm for butt and lap welds , Butt-and lap welds on copper (maximum thickness of 8mm), Brazing is limited to mild steel only (maximum thickness of 3mm), Gas cutting is limited to mild steel only (maximum thickness of 6mm).

Human Resource Requirements:

- Trainers should have a minimum requirement to include a level 4 qualification and a level 5 facilitator qualification that includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent or at least 5 years relevant experience working within en electrical-related industry with a recognized Trade Certificate.
- Trainer/learner ratio 1 to 12
- Workshop coach/learner ratio 1 to 4

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)

- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements
- Compliant with Compensation for Occupational Injuries and Diseases Act (COIDA) requirements

1.4 Critical Practical Activities to be Assessed Externally for the Module

- None

1.5 Exemptions

- None

2 671101000-PM-02, Plan worksite set up for installing, wiring and connecting electrical equipment and control systems, L3, Cr5

2.1 Purpose of the Practical Skill Module

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to planning worksite set up for installation, wiring and connection of electrical equipment and control systems

The learner will be required to:
PM-02-PS01: Undertake risk assessment in accordance with all statutory requirements
PM-02-PS02: Read and interpret electrical drawings
PM-02-PS03: Plan the worksite set-up

2.2 Guidelines for Practical Skills

2.2.1 PM-02-PS01: Undertake a preliminary risk assessment

Scope of Practical Skill

Given work instructions, checklists, work area, case study, drawings, documents, templates, forms, safety and quality principles, standard operating procedures and, statutory requirements, the learner should be able to:

PA0101 Conduct a preliminary risk assessment.
PA0102 Identify the hazards.
PA0103 Relate the risk to the hazard.
PA0104 Conduct mitigation of the risk.

Applied Knowledge

AK0101 Safety procedures
AK0102 Statutory requirements for hazardous conditions/material/substance.
AK0103 Risk assessment procedure for specific context
AK0104 Inspection procedure
AK0105 Recording/reporting procedure
AK0106 Approval procedures

Internal Assessment Criteria

Risk assessments, including work related hazards and ergonomics, are carried out and reports completed as per statutory requirements.
Evidence of mitigation is observed in accordance with standard operating procedures

Approved work permit or other documentation is completed to reflect risk assessment conducted in accordance with approval procedures

2.2.2 PM-02-PS02: Read and interpret electrical drawings

Scope of Practical Skill

Given work instructions, work area, case study, documents, templates, the learner should be able to:

PA0201 Identify signs and symbols

PA0202 Read and interpret electrical drawings

Applied Knowledge

AK0201 Methods of interpreting scales

AK0202 Techniques of interpreting diagrams

AK0203 Procedures for evaluating the work site.

Internal Assessment Criteria

Signs and symbols were correctly identified according to the IEC(International Electrical compliance standards)

Electrical diagrams were correctly interpreted, using schematics, plans, wiring and layout representations according to worksite requirements.

2.2.3 PM-02-PS03: Plan the worksite set-up

Scope of Practical Skill

Given work instructions, work area, case study, documents, the learner should be able to:

PA0201 Compile a list of tools, material and equipment required

PA0202 Compile a list of human resources required

PA0203 Compile a work flow diagram

Applied Knowledge

AK0201 Knowledge of tools, material and equipment required to perform various functions within the worksite

AK0202 Knowledge of human resources required to perform various functions within the worksite

AK0203 Analytic techniques for interpreting work instructions

AK0204 Knowledge of workflow processes

Internal Assessment Criteria

The relevant tools, material and equipment were correctly listed and quantities recorded in accordance with the task specification

The correct human resources were listed that meet the job specification

The work flow / work order was correctly analysed and applied in accordance with the task specification

2.3 Provider Accreditation Requirements for the Module

Physical Requirements:

Demonstrate access to:

- Electrical environment
- categories of tools, equipment and processes in order for learners to be able to plan worksite set up for installing, wiring and connecting electrical equipment and control systems

Human Resource Requirements:

- Trainers should have a minimum requirement to include a level 4 qualification and a level 5 facilitator qualification that includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent or at least 5 years relevant experience working within en electrical-related industry with a recognized Trade Certificate.
- Trainer/learner ratio 1 to 12
- Workshop coach/learner ratio 1 to 4

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements
- Compliant with Compensation for Occupational Injuries and Diseases Act (COIDA) requirements

2.4 Critical Practical Activities to be Assessed Externally for the Module

None

2.5 Exemptions

- None

3 671101000-PM-03, Prepare worksite set up for installing, wiring and connecting electrical equipment and control systems, L3, Cr30

3.1 Purpose of the Practical Skill Module

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to preparing worksite set up for installation, wiring and connection of electrical equipment and control systems

The learner will be required to:
PM-03-PS01: Procure resources
PM-03-PS02: Prepare and transport resources
PM-03-PS03: Prepare work site, equipment, tools, consumables and materials

3.2 Guidelines for Practical Skills

3.2.1 PM-03-PS01: Procure resources

Scope of Practical Skill

Given work instructions, checklists, work area, activity documents, safety and quality principles and standard operating procedures, the learner should be able to:
PA0101 Obtain human resources required.
PA0102 Requisition (obtain) tools and equipment required.
PA0103 Requisition (obtain) material and consumables required.
PA0104 Determine functionality of tools and testing equipment

Applied Knowledge

AK0101 Procurement procedures
AK0102 Resource determination methods
AK0103 Techniques and procedures for requisitioning

Internal Assessment Criteria

The Human resources were determined and listed to meet the specific needs of the activity and are fit for purpose
Tools and testing instruments required were determined and procured to meet the specific needs of the activity and are fit for purpose
Equipment were procured to meet the specific needs of the activity and are fit for purpose
Material requirements were procured to meet the specific needs of the activity and are fit for purpose

Consumable rquirements were procured to meet the specific needs of the activity and are fit for purpose

3.2.2 PM-03-PS02: Prepare and move resources

Scope of Practical Skill

Given work instructions, checklists, work area, activity documents, safety and quality principles and standard operating procedures, the learner should be able to:

PA0201 Load and off load resources

PA0202 Procure type and size of moving equipment

PA0203 Stack and secure tools, material and equipment

PA0203 Store tools, material and equipment on site

Applied Knowledge

AK0201 Basic lifting techniques

AK0202 Use of material safety data sheet

Internal Assessment Criteria

3.2.3 PM-03-PS03: Prepare work site and equipment

Scope of Practical Skill

Given work instructions, checklists, work area, activity documents, safety and quality principles and standard operating procedures, the learner should be able to:

PA0301 Undertake safety checks

PA0302 Source temporary electrical supplies for use

PA0303 Position equipment for installation

Applied Knowledge

AK0301 Lock out procedures

AK0302 Relevant subsections of SANS 10142-1

AK0303 Installation requirements

AK0304 Site specific rules and regulations

Internal Assessment Criteria

A safety report was completed that contain all relevant areas of the installation

Equipment and components were correctly positioned according to the installation requirements

The relevant subsections of SANS 10142-1 were correctly interpreted and applied

3.3 Provider Accreditation Requirements for the Module

Physical Requirements:

Demonstrate access to:

- Electrical environment
- Categories of tools, equipment and processes in order for learners to be able to prepare worksite set up for installing, wiring and connecting electrical equipment and control systems

Human Resource Requirements:

- Trainers should have a minimum requirement to include a level 4 qualification and a level 5 facilitator qualification that includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent or at least 5 years relevant experience working within en electrical-related industry with a recognized Trade Certificate.
- Trainer/learner ratio 1 to 12
- Workshop coach/learner ratio 1 to 4

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements
- Compliant with Compensation for Occupational Injuries and Diseases Act (COIDA) requirements

3.4 Critical Practical Activities to be Assessed Externally for the Module

None

3.5 Exemptions

- None

4 671101000-PM-04, Install wire-ways, L4, Cr5

4.1 Purpose of the Practical Skill Module

The focus of the learning in this module is on providing the learner an opportunity to: Practice electrical skills within a simulated work environment. The learners will be practicing skills related to the installation of wire-ways

The learner will be required to:
PM-04-PS01: Confirm the selection and installation method of the selected wire ways
PM-04-PS02: Use installation tools and equipment
PM-04-PS03: Design and install wire ways

4.2 Guidelines for Practical Skills

4.2.1 PM-04-PS01: Confirm the selection and installation method of the selected wire ways

Scope of Practical Skill

Given work instructions, checklists, work area, activity documents, templates, safety and quality principles and standard operating procedures, the learner should be able to:

PA0101 Select the correct wireways
PA0102 Select the method of installation

Applied Knowledge

AK0101 Relevant subsections of SANS 10142-1
AK0102 Istallation methods and techniques
AK0103 Hazard and risk procedures

Internal Assessment Criteria

The correct wire ways were selected according to SANS 10142-1 that meet the operational conditions of the installation.
The correct installation methods were selected according to SANS 10142-1, the relevant job instruction and environmental requirements.

4.2.2 PM-04-PS02: Use of installation tools and equipment

Scope of Practical Skill

Given work instructions, checklists, work area, activity documents, safety and quality principles and standard operating procedures, the learner should be able to*:*

PA0201 Use Tools, Materials and Equipment
PA0202 Use Personal Protective Equipment

Applied Knowledge

AK0201 Methods and techniques for using personal protective equipment

AK0202 Methods and techniques of using tools

AK0203 Methods and techniques of using power tools

AK0204 Methods and techniques of ensuring workshop / worksite safety

Internal Assessment Criteria

Tools, material and equipment were safely and correctly used while adhering to worksite and workshop safety procedures.

Personal protective equipment was correctly selected and used according to statutory requirements.

Power tools were selected and used correctly and safely while adhering fully to the workshop safety regulations.

4.2.3 PM-04-PS03: Design and install wire ways

Scope of Practical Skill

Given work instructions, checklists, work area, activity documents, safety and quality principles and standard operating procedures, the learner should be able to:

PA0301 Design the layout of wireways

PA0302 Install wire ways

PA0303 Terminate and join the wireways

PA0304 Install wire way accessories

PA0305 Bond wireways

Applied Knowledge

AK0301 Methods and techniques for using personal protective equipment

AK0302 Methods and techniques of using tools

AK0303 Methods and techniques of using power tools

AK0304 Methods and techniques ensuring workshop / worksite Safety

AK0305 Relevant subsections of SANS 10142-1

AK0306 Safety and performance standards of wireways

Internal Assessment Criteria

Conduit was correctly installed and bent to the correct radius as prescribed in SANS 10142-1

Cable racks, ladders and trays were correctly installed as prescribed by the manufacturerõs specifications

Trunking and ducting were correctly installed as prescribed by the manufacturerõs specifications

The correct methods for terminating and joining wireways were used in accordance with the installation requirements.
The installation of wireways reflected the spesific selection of fastening and support requirements of the installation.
The installation of wireways reflected the specific use of inspection points and accessories required according to SANS 10142-1.
The correct methods for the installation of wireways were selected that fully complies with SANS 10142-1.
The wire ways were installed neatly (vertically, horizontally and offsets parallel and similar) and complies with industry acceptable standard.

4.3 Provider Accreditation Requirements for the Module

Physical Requirements:

Demonstrate access to:

- Electrical environment
- Categories of tools, equipment and processes in order for learners to be able to install and repair wire-ways

Human Resource Requirements:

- Trainers should have a minimum requirement to include a level 4 qualification and a level 5 facilitator qualification that includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent or at least 5 years relevant experience working within en electrical-related industry with a recognized Trade Certificate.
- Trainer/learner ratio 1 to 12
- Workshop coach/learner ratio 1 to 4

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements
- Compliant with Compensation for Occupational Injuries and Diseases Act (COIDA) requirements

4.4 Critical Practical Activities to be Assessed Externally for the Module

None

4.5 Exemptions

- None

5 671101000-PM-05, Install, wire and connect electrical equipment and control systems, L3, Cr38

5.1 Purpose of the Practical Skill Module

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to installing, wir9ng and connecting electrical equipment and control systems.

The learner will be required to:
PM-05-PS01: Identify hazards within the installation
PM-05-PS02: Confirm the selection and installation method of the electrical equipment and control systems
PM-05-PS03: Use installation tools and personal protective equipment
PM-05-PS04: Install equipment and control systems
PM-05-PS05: Wire electrical equipment and control systems
PM-05-PS06: Terminate and connect cables and conductors

5.2 Guidelines for Practical Skills

5.2.1 PM-05-PS01: Identify hazards within installation *Scope of Practical Skill*

Given simulated hazards (e.g. oil on floor, live equipment within reach, working next to open trench, etc.), Risk assessment form, the learner should be able to:

PA0101 Inspection of site and installation
PA0102 Risk assessment of the installation
PA0103 Mitigate and or rectify the identified hazards

Applied Knowledge

AK0101 Risk assessment techniques/procedures
AK0102 Health and safety reporting procedures
AK0103 Environmental procedures for the disposal of hazardous substances
AK0104 Identification of hazardous substances
AK0105 Electrical safety procedures for working in close proximity to live equipment

Internal Assessment Criteria

Risk assessment techniques were used to identify risks within the installation in accordance with workshop practices.
Risks were mitigated and or rectified through the implementation of the correct risk management procedures.
A risk assessment report was completed that included health and safety considerations in accordance with risk management procedures.

5.2.2 PM-05-PS02: Confirm the selection and installation method of the electrical equipment and control systems

Scope of Practical Skill

Given Job specification, Drawings, Manufacturerõs manuals, provided equipment/control systems, the learner should be able to:

PA0201 Select equipment and control system according to design specifications.

PA0202 Interpret drawings

PA0203 Use manufaturer specifications

Applied Knowledge

AK0201 Relevant subsections of SANS 10142-1

AK0202 Knowledge of electrical components and switchgear

AK0203 Installation techniques of electrical components and switchgear

AK0204 Read and interpret electrical drawings and installation specifications

AK0205 Knowledge of electronic components

AK0206 Read and interpret electronic circuit diagrams

AK0207 Installation techniques of electronic components

Internal Assessment Criteria

Drawings and/or manufacturer specifications were correctly interpreted and the correct installation method was selected that meet the installation specifications, for the given equipment and control systems and complies fully with SANS 10142-1.

The correct equipment and control systems were selected including Batteries, Transformers, Measuring instruments (portable & fixed), Testing instruments, Cables, Switchgear and control gear, Rotating electrical machinery - AC, Rotating Electrical Machinery - DC, Rotating electrical machinery - Alternators and Generators, Protection devices, luminaries, current transformers, potential transformers and shunts according to the design specifications.

The correct installation methods were selected for Batteries, Transformers, Measuring instruments (portable & fixed), Testing instruments, Cables, Switchgear and control gear, Rotating electrical machinery - AC, Rotating Electrical Machinery - DC, Rotating electrical machinery - Alternators and Generators, Protection devices, luminaries, current transformers, potential transformers and shunts according to the design specifications.

The correct electronic components were selected including resistors, diodes, zener diodes, capacitors, transistors according to the design specifications.

The correct installation method was selected for resistors, diodes, zener diodes, capacitors, transistors according to the design specifications.

5.2.3 PM-05-PS03: Use installation tools

Scope of Practical Skill

Given Tools: hand tools (standard Electricians toolbox), portable power tools (drilling machine, jigsaw, and grinder); PPE: Overall, safety shoes, gloves, goggles, face shield, hard hat, hearing protection the learner should be able to:

PA0301 Use installation tools.

PA0302 Use task specific personal protective equipment

Applied Knowledge

AK0301 Procedure for using personal protective equipment

AK0302 Techniques for indentifying, inspecting, using, maintaining and caring for hand tools

AK0303 Techniques for indentifying, selecting, using, maintaining and caring for power tools

AK0304 Workshop safety procedures and practices

Internal Assessment Criteria

Hand tools were correctly used, as per workshop practices and safety procedures.

Portable power tools were correctly used, as per workshop practices and safety procedures.

The correct personal protective equipment was used and complied with the workshop safety procedures.

5.2.4 PM-05-PS04: Install equipment and control systems

Scope of Practical Skill

Given equipment and control systems Includes: Batteries, Transformers, Measuring instruments (portable & fixed), Testing instruments, Cables, Switchgear and control gear, Rotating electrical machinery - AC, Rotating Electrical Machinery - DC, Rotating electrical machinery - Alternators and Generators, Protection devices, luminaries, current transformers, potential transformers and shunts and control systems I the learner should be able to:

PA0401 Install equipment and control systems

PA0402 Select and install protection devices

Applied Knowledge

AK0401 Relevant subsections of SANS 10142-1

AK0402 Statutory requirements regarding machine guards and lock-out systems.

AK0403 Protection principles

AK0404 Installation methods and techniques of electrical equipment and control systems

AK0405 Knowledge of relevant equipment and components

AK0406 Techniques for installalion of basic electronic components

Internal Assessment Criteria

The equipment and control systems were correctly selected as per job and manufacturerôs specifications and the installation complies with SANS 10142-1.

The equipment and control systems were correctly installed as per job and manufacturerôs specifications and the installation complies with SANS 10142-1.

The correct protection equipment and level of protection was selected as per job, manufacturerôs specifications and relevant statutory requirements

The correct protection equipment and level of protection was installed as per job, manufacturerôs specifications and relevant statutory requirements.

Electronic components were correctly installed, soldered and the circuitry was functional.

5.2.5 PM-05-PS05: Wire electrical equipment and control systems

Scope of Practical Skill

Given Electrical drawings, Conductors, cables, relevant tools and Consumables the learner should be able to:

PA0501 Use relevant types of tools and equipment

PA0502 Wire low voltage electrical systems, protection devices and electrical components.

PA0503 Clean the worksite

Applied Knowledge

AK0501 Wiring techniques

AK0502 Interpretation of electrical drawings

AK0503 Techniques for using relevant tools

Internal Assessment Criteria

Electrical equipment, control systems and protection devices were correctly wired to conform to safety, statutory and performance specifications.

Relevant tools and equipment were correctly used according to job and statutory requirements.

The wiring of electrical equipment and control systems were carried out in compliance with SANS 10142-1.

The wiring of electrical equipment and control systems was neatly loomed (vertically and horizontally) and complies with industry acceptable standard.
The work site/area was left neat and tidy as per workshop procedures.

5.2.6 PM-05-PS06: Terminate, joint and connect cables and conductors

Scope of Practical Skill

Given Termination schedules/drawings, Cable/core/terminal numbering, Lugs, connector blocks, cable, glands/shrouds, Tools: Electricians hand tools, crimpers, drilling machine, hole saws and joining/splicing kits the learner should be able to:

PA0601 Make off and terminate cables to electrical equipment and control systems
PA0602 Join cables and conductors
PA0602 Terminate and connect conductors to electrical equipment and control systems

Applied Knowledge

AK0601 Termination and connecting techniques
AK0602 Cable and conductor jointing techniques
AK0603 Hazards associated with loose or defective connections
AK0604 Use of hand-and power tools
AK0605 Cable glanding procedures
AK0606 Safety, statutory and performance specifications
AK0607 Cable and conductor types, sizes and selection methods

Internal Assessment Criteria

The types and sizes of electrical cables and conductors were correctly identified and selected in accordance with the manufacturerôs specifications and complies with SANS 10142-1.
Electrical cables were correctly terminated according to safety, statutory and manufacturerôs specifications
Electrical cables and conductors were correctly jointed, according to safety, statutory and manufacturerôs specifications.
Electrical cables were correctly and neatly terminated according to safety, statutory requirements and comply with industry acceptable standards.
Electrical conductors were correctly connected and neatly secured in accordance with statutory requirements and industry acceptable standards.

5.3 Provider Accreditation Requirements for the Module

Physical Requirements:

Demonstrate access to:

- Electrical environment
- categories of tools, equipment and processes in order for learners to be able to install, wire and connect electrical equipment and control systems

Human Resource Requirements:

- Trainers should have a minimum requirement to include a level 5 qualification that includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent or at least 5 years relevant experience working within en electrical-related industry
- Trainer/learner ratio 1 to 15
- Workshop coach/learner ratio 1 to 10

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements
- Compliant with Compensation for Occupational Injuries and Diseases Act (COIDA) requirements

5.4 Critical Practical Activities to be Assessed Externally for the Module

None

5.5 Exemptions

- None

6 671101000-PM-06, Conduct pre-commission inspection (power off) and test new and existing installations, L3, Cr5

6.1 Purpose of the Practical Skill Module

The focus of the learning in this module is on providing the learner an opportunity to:
Practice electrical skills within a simulated work environment. The learners will be practicing skills related to conducting pre-commission inspection (power off) and testing new and existing installations.

The learner will be required to:
PM-06-PS01: Inspect electrical equipment, control systems and installations under power off conditions
PM-06-PS02: Test electrical equipment, control systems and installations under power off conditions

6.2 Guidelines for Practical Skills

6.2.1 PM-06-PS01: Inspect electrical equipment, control systems and installations under power off conditions

Scope of Practical Skill

Given a simulated new/existing installation, Electrical drawings, Operational manual/procedures, Inspection checklist, direct supervision under power on conditions, the learner should be able to:

PA0101 Visually inspect installed equipment, control systems and installations
PA0102 Confirm conductor and cable selection
PA0103 Inspect all connections and terminations

Applied Knowledge

AK0101 Installation specifications equipment, control systems and installations
AK0102 Relevant subsections of SANS 10142-1
AK0103 Operational procedures of equipment, control systems and installations
AK0104 Methods for the termination of wiring and cabling

Internal Assessment Criteria

Operational procedures were correctly interpreted and applied in accordance with installation specifications
Inspection report that confirms the correctness of the installation was completed and submitted in accordance with the visual inspection subsection of SANS 10142-1 and relevant workshop practices.
All terminations and connections were inspected and comply with SANS 10142-1.

The installation's functionality was inspected and complies with SANS 10142-1 and/or the relevant manufacturers specifications.

6.2.2 PM-06-PS02: Test electrical equipment, control systems and installations under power off conditions

Scope of Practical Skill

Given a simulated new/existing installation, Electrical test instruments: insulation resistance tester, multi-meter, earth leakage tester, earth loop impedance tester, ammeters, phase rotation meter, Electrical drawings/wiring diagrams, personal protective equipment: rubber gloves, face shield, hard hat, safety shoes, overalls, *direct supervision under power on conditions,* the learner should be able to:

PA0201 Interpret task instructions

PA0202 Select and use of the correct test instruments

PA0203 Select and use of relevant personal protective equipment

PA0204 Isolate and lock-out of identified equipment.

PA0206 Test electrical equipment, control systems and installations

PA0207 Interpret, record and report test results

Applied Knowledge

AK0201 Relevant subsections of SANS 10142-1

AK0202 Testing techniques for electrical components and protective devices

AK0203 Test parameters for protective devices and electrical components

AK0204 Techniques for the safe use of electrical testing equipment

Internal Assessment Criteria

Work Instructions and testing procedures were correctly interpreted and applied.

Test results were correctly interpreted and recorded in accordance with relevant subsections of SANS 10142-1 and SANS 10242.

A Test report that confirms the correctness of the installation was completed in accordance with the testing subsections of SANS 10142-1, SANS10242 and relevant workshop practices.

Personal protective equipment was selected and correctly used in accordance with the relevant subsection of the OHS Act and the Mines Health and Safety Act.

The selected equipment was isolated and locked out.

6.3 Provider Accreditation Requirements for the Module

Physical Requirements:

Demonstrate access to:

- Electrical environment
- Categories of tools, equipment and processes in order for learners to be able to conduct pre-commission inspection (power on and off) and test for new and existing installations

Human Resource Requirements:

- Trainers should have a minimum requirement to include a level 5 qualification that includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent or at least 5 years relevant experience working within en electrical-related industry
- Trainer/learner ratio 1 to 15
- Workshop coach/learner ratio 1 to 10

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements
- Compliant with Compensation for Occupational Injuries and Diseases Act (COIDA) requirements

6.4 Critical Practical Activities to be Assessed Externally for the Module

None

6.5 Exemptions

- None

7 671101000-PM-07, Carry out commissioning tests, L3, Cr13

7.1 Purpose of the Practical Skill Module

The focus of the learning in this module is on providing the learner an opportunity to:
Carry out commissioning tests

The learner will be required to:
PM-07-PS01: Carry out commissioning tests (with power on) on electrical installations and control systems
PM-07-PS02: Rectify defects found on electrical installations and control systems
PM-07-PS03: Report product deficiencies and rectify workmanship

7.2 Guidelines for Practical Skills

7.2.1 PM-07-PS01: Carry out commissioning tests (with power on) on electrical installations and control systems

Scope of Practical Skill

Given drawings and check lists, fault finding procedure, statutory requirements [OHS MH&S SANS 10142-1]), (Isolating procedures, Relevant hand tools, multimeters, insulation tester, clamp-on Amp meter, visual inspection forms, insulation resistance between conductors testing documents, insulation resistance between conductors and earth documents, continuity tests, functionality tests with direct supervision under power on conditions the learner should be able to:

PA0101 Carry out risk assessment
PA0102 Use the relevant tools and testing equipment
PA0103 Carry out relevant commissioning tests
PA0104 Interpret commissioning tests results
PA0105 Report commissioning results

Applied Knowledge

AK0101 Techniques to carry out commisioning tests
AK0102 Fault finding techniques
AK0103 Isolating and energizing processes
AK0104 Risks associated with live testing
AK0105 Correct use of personal protective equipment

Internal Assessment Criteria

Work Instructions and testing procedures were correctly interpreted and applied.
Risks were identified and mitigated in accordance with risk management procedures

A test report that confirms the correctness of the installation was completed in accordance with relevant statutory requirements.

Isolating and energizing processes were correctly followed

Tools and testing equipment including the relevant hand tools, multimeters, insulation tester and tong tester is correctly used

The relevant commissioning tests are correctly completed according to relevant regulations

7.2.2 PM-07-PS02: Rectify defects found on electrical installations and control systems

Scope of Practical Skill

Given work instructions, checklists, work area, testing instruments, and standard operating procedures, the learner should be able to:

PA0201 Isolate the defective electrical installation or control system

PA0202 Interpret the applicable operating procedure

PA0203 Trace and identify the defect on electrical installation or control system

PA0204 Repair defects on electrical installation or control system

Applied Knowledge

AK0201 Isolating procedures

AK0202 Reading and interpretation of electrical drawings and operating procedure of electrical installation or control system

AK0203 Fault finding procedures and techniques for electrical installation or control system

AK0204 Electrical testing equipment and testing procedures

AK0205 Relevant hand tools required for repairs

AK0206 Procedures for repairing and replacing electrical installation or control system components

Internal Assessment Criteria

Electrical installation or control system was correctly and safely isolated according to isolating procedures

Operating procedures and electrical diagrams were correctly interpreted according to manufacturerôs specifications.

The correct electrical testing and fault finding procedures were applied.

Defects were rectified as per installation requirements.

Repairs were recorded and reported as per reporting procedures.

7.2.3 PM-07-PS03: Record and report commissioning results and hand over the installations and control systems

Scope of Practical Skill

Given job cards, test reports and hand-over documentation, the learner should be able to:

PA0301 Record and report commissioning test results of installations and control systems

PA0302 Complete hand-over documentation

Applied Knowledge

AK0301 Relevant statutory recording requirements

AK0302 Data capturing and information procedure

AK0303 Hand-over procedure

Internal Assessment Criteria

Measurements and observations were interpreted and captured accurately according to manufacturers specifications

All the relevant units/variables were recorded accurately

Hand-over documents were completed as per hand-over procedures

7.3 Provider Accreditation Requirements for the Module

Physical Requirements:

Demonstrate access to:

- Electrical environment
- categories of tools, equipment and processes in order for learners to be able to carry out commissioning tests

Human Resource Requirements:

- Trainers should have a minimum requirement to include a level 5 qualification that includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent or at least 5 years relevant experience working within en electrical-related industry
- Trainer/learner ratio 1 to 15
- Workshop coach/learner ratio 1 to 10

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)

- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements
- Compliant with Compensation for Occupational Injuries and Diseases Act (COIDA) requirements

7.4 Critical Practical Activities to be Assessed Externally for the Module

None

7.5 Exemptions

- None

8 671101000-PM-08, Fault find and repair electrical control systems and electrical installations, L4, Cr22

8.1 Purpose of the Practical Skill Module

The focus of the learning in this module is on providing the learner an opportunity to:
Fault find and repair electrical control systems and electrical installations

The learner will be required to:
PM-08-PS01: Obtain work instructions and gather drawings and documentation
PM-08-PS02: Select tools and testing instruments
PM-08-PS03: Carry out fault finding
PM-08-PS04: Rectify faults where applicable
PM-08-PS05: Record findings and provide feedback

8.2 Guidelines for Practical Skills

8.2.1 PM-08-PS01: Obtain work instructions and gather drawings and documentation

Scope of Practical Skill

Given work instructions, checklists, case study, activity documents, any templates, form, safety and quality principles and standard operating procedures procedure information available, the learner should be able to:
PA0101 Interpret work instructions
PA0102 Gather documentation (work permits, drawings, work file)

Applied Knowledge

AK0101 Plan and prepare procedures
AK0102 Risk assessment procedure
AK0103 Lock out procedures
AK0104 Relevant SANS 10142-1 requirements
AK0105 Safety procedures

Internal Assessment Criteria

Correct work instructions were followed in accordance with relevant workshop procedures
Correct documentation including checklists were obtained

8.2.2 PM-08-PS02: Select tools and testing instruments

Scope of Practical Skill

Given work instructions, checklists, work area, case study, testing instruments, activity documents, any templates, form, safety and quality principles and standard operating procedures the learner must be able to:

PA0201 Select hand and power tools

PA0202 Select testing instruments

Applied Knowledge

AK0201 Hand tools and their uses

AK0202 Power tools and their uses

AK0203 Testing instruments and their uses

AK0204 Safety and standard operating procedures.

Internal Assessment Criteria

Correct hand tools were selected

Correct power were selected

Correct testing equipment was selected

8.2.3 PM-08-PS03: Carry out faultfinding

Scope of Practical Skill

Given work instructions, checklists, work area, case study, testing instruments, activity documents, any templates, form, safety and quality principles and standard operating procedures procedure information available, the learner should be able to:

PA0301 Carry out tests that include but not limited to: visual inspections, functional, continuity, insulation resistance and polarity tests

PA0302 Coduct fault finding

Applied Knowledge

AK0301 Fault finding procedures

AK0302 Fault finding techniques

AK0303 Use of testing instruments

AK0304 Interpretation of electrical schematics and drawings

AK0305 Functionality of components

AK0305 Safety and standard operating procedures.

Internal Assessment Criteria

Faultfinding procedures were correctly followed

Fault finding techniques were correctly applied

Electrical schematics and drawings were correctly interpreted

Test instruments were correctly and safely used

Safety and standard operating procedures were correctly followed

Functionality of components inspected in accordance with manufacturers specifications

Faults were correctly identified

Causes were correctly interpreted

8.2.4 PM-08-PS04: Rectify faults and re-commission

Scope of Practical Skill

Given the location and cause of the fault, the learner should be able to:

PA0401 Rectify the faults identified

PA0402 Complete a re-commissioning test

PA0403 Report findings and provide feedback

Applied Knowledge

AK0401 Functionality of components

AK0402 Various fault conditions

AK0403 Various control systems

AK0405 Use of testing instruments

AK0406 Interpretation of electrical schematics and drawings

AK0407 Techniques to carry out commisioning tests

AK0408 Fault finding techniques

AK0409 Isolating and energizing processes

AK04010 Risks associated with live testing

AK04011 Correct use of personal protective equipment

AK04012 Knowledge of recording procedures and documentation

AK04013 Feedback procedures

Internal Assessment Criteria

Electrical installation or control system was correctly and safely isolated according to isolating procedures

Operating procedures and electrical diagrams were correctly interpreted according to manufacturerôs specifications.

Identified faults were correctly rectified to the original operating status

Risks associated with live testing were correctly identified and safety precautions taken.

The correct electrical testing procedures were applied.

Re-commissioning tests were done and complied with standard operating procedures

Documentation was correctly completed according to recording procedures

Feedback was correctly given within the prescribed time frame

Causes were correctly interpreted

8.3 Provider Accreditation Requirements for the Module

Physical Requirements:

Demonstrate access to:

- Electrical environment
- Categories of tools, equipment and processes in order for learners to be able to fault find and repair electrical control systems and electrical installations

Human Resource Requirements:

- Trainers should have a minimum requirement to include a level 5 qualification that includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent or at least 5 years relevant experience working within en electrical-related industry
- Trainer/learner ratio 1 to 12
- Workshop coach/learner ratio 1 to 4

Legal Requirements:

- Accredited with National Artisan Moderation Body (NAMB)/Assessment Quality Partner (AQP)
- Compliant with Safety, Health, Environmental, Risk and Quality (SHERQ) requirements
- Compliant with Compensation for Occupational Injuries and Diseases Act (COIDA) requirements
-

8.4 Critical Practical Activities to be Assessed Externally for the Module

None

8.5 Exemptions

- None

SECTION 3C: WORK EXPERIENCE MODULE SPECIFICATIONS

List of Work Experience Module Specifications

- 671101000-WM-01, Planning and preparation process for the wiring, connection, testing, inspecting, commissioning and maintaining of electrical installations and control systems, L4, Cr 8
- 671101000-WM-02, Processes of installing, wiring and connecting of electrical equipment and control systems, L4, Cr74
- 671101000-WM-03, Processes of testing and inspecting of electrical equipment, control systems and installations, L4, Cr 15
- 671101000-WM-04, Processes of commissioning electrical installations and control systems, L4, Cr15
- 671101000-WM-05, Maintenance processes for electrical installations and control systems, L4, Cr44

671101000-WM-01, Planning and preparation process for the wiring, connection, testing, inspecting, commissioning and maintaining of electrical installations and control systems, L4, Cr8

1.1 Purpose of the Work Experience Module

The focus of the work experience is on providing the learner an opportunity to:

Gain exposure to work as part of a team in the planning and preparation process for the wiring, connection, testing, inspecting, commissioning and maintaining of electrical installations and control systems in a real life electrical environment. The Learner will be required to successfully complete each Work Experience at least three (3) times

The learner will be required to:

WM-01-WE01: Observe and assist a qualified person in the planning and preparation process for electrical installations and control systems

WM-01-WE02: Plan and prepare for electrical installations and control systems under the direct supervision of a qualified person

WM-01-WE03: Undertake all activities without assistance, but under supervision, to plan and prepare for electrical installations

1.2 Guidelines for Work Experiences

1.2.1 WM-01-WE01: Observe and assist a qualified person in the planning and preparation process for electrical installations and control systems

Scope of Work Experience

The person will be expected to engage in the following work activities:

WA0101 Obtaining relevant documentation and completing requisition/order

WA0102 Obtaining drawings in order to determine job requirements

WA0103 Obtaining tools and equipment from stores and to ensure transportation to worksite

WA0104 Checking worksite for safety and risk analysis requirements

Supporting Evidence

SE0101 Obtained and signed requisition/order documentation by both learner and a qualified person

SE0102 Signed job card by both learner and a qualified person

SE0103 Signed workplace log or other relevant documentation to indicate number of hours spent by both learner and a qualified person

SE0104 Signed off completed risk assessment checklist by both learner and a qualified person

1.2.2 WM-01-WE02: Plan and prepare for electrical installations and control systems under the direct supervision of a qualified person

Scope of Work Experience

The person will be expected to engage in the following work activities:

WA0201 Obtain relevant documentation and complete requisition

WA0202 Obtain drawings in order to determine job requirements under

WA0203 Obtain tools and equipment from stores and ensure transportation to worksite

WA0204 Checking worksite for safety and risk analysis requirements

Supporting Evidence

SE0201 Obtained and signed requisition/order documentation by both learner and a qualified person

SE0202 Signed job card by both learner and a qualified person

SE0203 Signed workplace log or other relevant documentation to indicate number of hours spent by both learner and a qualified person

SE0204 Signed off completed risk assessment checklist by both learner and a qualified person

1.2.3 WM-01-WE03: Undertake all activities without assistance, but under supervision, to plan and prepare for electrical installations.

Scope of Work Experience

The person will be expected to engage in the following work activities:

WA0301 Obtain relevant documentation and complete requisition/order

WA0302 Obtain drawings in order to determine job requirements

WA0303 Obtain tools and equipment from stores and ensure transportation to worksite

WA0304 Checking worksite for safety and risk analysis requirements

Supporting Evidence

SE0301 Obtained and signed requisition/order documentation as verified by a signature from a qualified person

SE0302 Signed job card as verified by a signature from a qualified person

SE0303 Signed workplace log or other relevant documentation to indicate number of hours spent as verified by a signature from a qualified person

SE0304 Signed off completed risk assessment checklist as verified by a signature from a qualified person

1.3 Contextualised Workplace Knowledge

1 Company specific policies and procedures (LV operating procedures, lock-out procedures, risk assessment and safety procedures and environmental policies)
2 Company specific quality management systems
3 Relevant statutory requirements: Not limited to OHS Act; Construction Regulations; Mine Health and Safety Act, Municipal by-laws, environmental standards, traffic regulations, operating regulations for high voltage systems.
4 SANS standards
5 Manufacturers specification

1.4 Criteria for Workplace Approval

Physical Requirements:

Access to *the following equipment*

Context: Mining

- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, single phase and three phase AC motors and general lighting, battery charging systems and associated medium voltage under dead conditions, underground cabling systems, trenched cable systems, direct current motors.

Context Municipal

- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, single phase and three phase alternating current motors and general lighting, battery charging systems, metering systems and associated medium voltage and under dead conditions, street lighting, overhead line systems, trenched cable systems

Context: Marine

- Transformers; distribution enclosures; distribution systems, floating earthing systems, metering units, single phase and three phase AC motors and general lighting, battery charging systems and associated medium voltage under dead conditions, direct current motors.

Context: Construction

- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, single phase and three phase AC motors and general lighting used

in domestic, industrial and emergency areas, trenched cable systems and metering systems.

Context: Chemical environments

- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, single phase and three phase AC motors and general lighting used in domestic, industrial and emergency areas ,battery charging systems, metering systems, trenched cable systems

Context: Metal and Manufacturing environments

- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, single phase and three phase AC motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, trenched cable systems, direct current motors.

Context: Agricultural environments

- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, single phase and three phase AC motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, trenched cable systems, direct current motors.

Context: Railway environments

- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, single phase and three phase AC motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, metering systems and associated medium voltage and HV switchgear under dead conditions to street lighting and stadium lighting, trenched cable systems, direct current motors.

Context: Energy environments

- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase AC motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, metering systems and associated medium voltage and HV switchgear under dead conditions, street lighting and stadium lighting, overhead line systems;

Access to the following control systems

- Alternating and Direct current control systems that may include: load control systems, load distribution systems, network protection systems and pilot cables.
- AC control gear that includes isolators, contactors, overload relays, timers, circuit breakers, relays, stop/start/emergency stops, limit switches and may include DC control gear.
- Control gear will include star delta, three phase controls (DOL, Three phase forward reverse, and sequence starters), and may include dual speed controls, auto transformer starters, variable speed drives, programmable logic controllers, DC speed control and resistance starters.
- Context: The Municipal and Marine environments may have access to pilot cables and level, limits, pressure, temperature and proximity switching
- Context: The mining, marine, agriculture, metal and manufacturing, chemical and railway environments must have access to DC control gear.

Access to the following Installations:

- Context: Apprentices within the Construction environments may work within residential premises, commercial premises, public premises, industrial premises, prefabricated buildings, construction and demolition site installations, agricultural and horticultural premises, caravans, caravan sites and similar sites, exhibitions, fairs and other temporary installations, extra low voltage lighting installations.
- Context: Apprentices within the Municipal environments may work within commercial premises, public premises, exhibitions, and other temporary installations, electrical installations for street lighting and access to distribution system networks associated MV switchgear under dead conditions.
- Context: Apprentices within the Mining environments may work within commercial premises, industrial premises, and fixed surface installations on mining properties, construction and demolition site installations access to distribution system networks associated MV switchgear under dead conditions.
- Context: Apprentices within the Railway environments may work within commercial premises, industrial premises, marinas, pleasure craft and house boats marine platforms access to distribution system networks associated MV switchgear under dead conditions.

- Context: Apprentices within the Energy environments may work within commercial premises and industrial premises access to distribution system networks associated MV switchgear under dead conditions.
- Context: Apprentices within the Marine environments may work within marinas, pleasure craft, house boats and marine platforms access to distribution system networks associated MV switchgear under dead conditions
- Context: Apprentices within the Agricultural environments may work within commercial premises, industrial premises, agricultural and horticultural premises.
- Context: Apprentices within the Manufacturing and steel environments may work commercial premises access to distribution system networks associated MV switchgear under dead conditions.
- Context: Apprentices within the Chemical environments may work commercial premises, access to distribution system networks associated MV switchgear under dead conditions.

- Tools and equipment to conduct occupational tasks
- The physical resources in terms of tools, equipment, systems, conditions and interfaces that the workplace must have to ensure that learners can participate in all work activities.

Human Resource Requirements:

- A qualified person with at least 3 years relevant experience working within an electrical-related industry which includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent
- Workplace coach: learner ratio 1 to 2
- A person with mentorship experience or preferably formal mentorship training

Legal Requirements:

- Compliant to all relevant labour relations and employment legislation
- Accredited with relevant authority
- Compliant with SHERQ requirements
- Any other statutory requirements relevant to the specific context

1.5 Additional Assignments to be Assessed Externally

None

671101000-WM-02, Processes of installing, wiring and connecting of electrical equipment and control systems, L4, Cr74

2.1 Purpose of the Work Experience Module

The focus of the work experience is on providing the learner an opportunity to:
Gain exposure to work as part of a team in the process of wiring, connection of electrical equipment and control systems in a real life electrical environment. The Learner will be required to successfully complete each Work Experience at least three (3) times.

The learner will be required to:
WM-02-WE01: Observe and assist a qualified electrician in the processes of installation, wiring and connection of electrical equipment and control systems
WM-02-WE02: Install, wire and connect electrical equipment and control systems under the direct supervision of a qualified electrician
WM-02-WE03: Undertake all activities without assistance, but under supervision, to install, wire and connect electrical equipment and control systems

2.2 Guidelines for Work Experiences

2.2.1 WM-02-WE01: Observe and assist a qualified electrician in the processes of installation, wiring and connection of electrical equipment and control systems

Scope of Work Experience

The person will be expected to engage in the following work activities:
WA0101 Apply drawing specifications
WA0102 Use access to height equipment
WA0103 Mark out and do measurements of the installation
WA0104 Drill and/ tap and/or chase walls and/or trenching
WA0105 Install and secure wire ways
WA0106 Mount and fasten equipment
WA0107 Draw in conductors and cables
WA0108 Make off cables
WA0109 Terminate cables and conductors
WA0110 Label and number cables and conductors

Supporting Evidence

SE0101 Completed observation checklist
SE0102 Completed section in logbook

SE0103 List of equipment installed

2.2.2 WM-02-WE02: Install, wire and connect electrical equipment and control systems under the direct supervision of a qualified electrician

Scope of Work Experience

The person will be expected to engage in the following work activities:

WA0201 Application of drawing specifications

WA0202 Use access equipment

WA0203 Mark out and do measurements of the site

WA0204 Drill and/ tap and/chase walls and/complete trenches

WA0205 Install and secure wire ways

WA0205 Mount and fasten equipment

WA0206 Draw in conductors and cables

WA0207 Make off cables

WA0208 Terminate cables and conductors

WA0209 Label and number cables and conductors

Supporting Evidence

SE0201 Completed observation checklist

SE0202 Completed section in logbook

SE0203 List of equipment installed

2.2.3 WM-02-WE03: Undertake all activities without assistance, but under supervision, to install, wire and connect electrical equipment and control systems

Scope of Work Experience

The person will be expected to engage in the following work activities:

WA0301 Apply drawing specifications.

WA0302 Select and use access equipment

WA0303 Mark out and do measurements of the site

WA0304 Drill and/ tap and/or chase walls and/or trenching

WA0305 Install and secure wire ways

WA0305 Mount and fasten equipment

WA0306 Draw in conductors and cables

WA0307 Make off cables

WA0308 Terminate cables and conductors

WA0309 Label and number cables and conductors

Supporting Evidence

SE0301 Completed observation checklist

SE0302 Completed section in logbook

SE0303 List of equipment installed

2.3 Contextualised Workplace Knowledge

1. Company specific policies and procedures (LV operating procedures, lock-out procedures, risk assessment and safety procedures and environmental policies)
2. Company specific quality management systems
3. Relevant statutory requirements: Not limited to OHS Act; Construction Regulations; Mine Health and Safety Act, Municipal by-laws, environmental standards, traffic regulations, operating regulations for high voltage systems.
4. SANS standards
5. Manufacturers specification

2.4 Criteria for Workplace Approval

Physical Requirements:

Access to the following wire ways

- Context: The Construction and Railway environments
  Learners must have access to Conduit: Flexible, metal and Polyvinyl chloride (PVC)trunking/ducting: Metal and Polyvinyl chloride, power skirting, cable trays/ladders, Cable trenches, bus bar trunking and straining wires.

- Context: The Mining, Chemical, Municipal, Marine, Metal and Manufacturing, Energy and Agricultural environments,
  Learners may have access to Conduit: Flexible, metal and Polyvinyl chloride(PVC) trunking/ducting: Metal and Polyvinyl chloride power skirting, cable trays/ladders, bus bar trunking, straining wires

- Context: The Mining environment
  Learners must have access to straining wires

Access to the following cables

- Context: All environments
  Learners in all environments must have access to low voltage steel wired armoured (SWA) cables and may be exposed to Tough Rubber Sheath (TRS) screen, airial

bundled cables(ABC), paper insulated lead cable(PILC), Linked Polyethelene cables(XLPE), Airdac, bare conductors, Optic fibre, Flexible Polyvinyl chloride(PVC)/rubber, screen cable, multi core sheath cable, single core, twin and earth.

- Context: All environments
  Learners in all environments must have access to low voltage joints and terminations under dead conditions only.
- Context: The Municipal and Energy environments
- Learners must have access to joints and terminations on medium voltage, high voltage under dead conditions.

- Context: The Mining environment
- Learners must have access to joints and terminations on MV under dead conditions.

Access to the following equipment

- Context: Mining environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, single phase and three phase alternating current motors and general lighting, battery charging systems and associated medium voltage under dead conditions, underground cabling systems, trenched cable systems, direct current motors.

- Context Municipal environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase alternating current motors and general lighting, battery charging systems, metering systems and associated medium voltage and under dead conditions, street lighting, overhead line systems, trenched cable systems

- Context: Marine environments
- Transformers; distribution enclosures; distribution systems, floating earthing systems, metering units, , single phase and three phase alternating current motors and general lighting, battery charging systems and associated medium voltage under dead conditions, direct current motors.

- Context: Construction environments

- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase alternating current motors and general lighting used in domestic, industrial and emergency areas, trenched cable systems and metering systems.

- Context: Chemical environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase alternating current motors and general lighting used in domestic, industrial and emergency areas ,battery charging systems, metering systems, trenched cable systems

- Context: Metal and Manufacturing environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase alternating current motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, trenched cable systems, direct current motors.

- Context: Agricultural environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase alternating current motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, trenched cable systems, direct current motors.

- Context: Railway environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase alternating current motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, metering systems and associated medium voltage and HV switchgear under dead conditions., to street lighting and stadium lighting, trenched cable systems, direct current motors.

- Context: Energy environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase alternating current motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, metering systems and associated medium voltage and high voltage

switchgear under dead conditions, street lighting and stadium lighting, overhead line systems;

Access to the following control systems

- Alternating and Direct current control systems that may include: load control systems, load distribution systems, network protection systems and pilot cables.
- AC control gear that includes isolators, contactors, overload relays, timers, circuit breakers, relays, stop/start/emergency stops, limit switches and may include DC control gear.
- Control gear will include star delta, three phase controls (DOL, Three phase forward reverse, and sequence starters), and may include dual speed controls, auto transformer starters, variable speed drives, programmable logic controllers, DC speed control and resistance starters.
- Context: The Municipal and Marine environments may have access to pilot cables and level, limits, pressure, temperature and proximity switching
- Context: The mining, marine, agriculture, metal and manufacturing, chemical and railway environments must have access to DC control gear.

Access to the following Installations:

- Context: Apprentices within the Construction environments may work within residential premises, commercial premises, public premises, industrial premises, prefabricated buildings, construction and demolition site installations, agricultural and horticultural premises, caravans, caravan sites and similar sites, exhibitions, fairs and other temporary installations, extra low voltage lighting installations.
- Context: Apprentices within the Municipal environments may work within commercial premises, public premises, exhibitions, and other temporary installations, electrical installations for street lighting and access to distribution system networks associated MV switchgear under dead conditions.
- Context: Apprentices within the Mining environments may work within commercial premises, industrial premises, and fixed surface installations on mining properties, construction and demolition site installations access to distribution system networks associated medium voltage switchgear under dead conditions.
- Context: Apprentices within the Railway environments may work within commercial premises, industrial premises, marinas, pleasure craft and house boats marine

platforms access to distribution system networks associated MV switchgear under dead conditions.

- Context: Apprentices within the Energy environments may work within commercial premises and industrial premises access to distribution system networks associated medium voltage switchgear under dead conditions.
- Context: Apprentices within the Marine environments may work within marinas, pleasure craft, house boats and marine platforms access to distribution system networks associated medium voltage switchgear under dead conditions
- Context: Apprentices within the Agricultural environments may work within commercial premises, industrial premises, agricultural and horticultural premises.
- **Context: Apprentices within the Manufacturing and steel environments may have access to** commercial premises , and may work on distribution system networks associated medium voltage switchgear under dead conditions.
- Context: Apprentices within the Chemical environments may work commercial premises, access to distribution system networks associated medium voltage switchgear under dead conditions

Human Resource Requirements:

- A qualified person with at least 3 years relevant experience working within an electrical-related industry which includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent
- Workplace coach: learner ratio 1 to 2
- A person with mentorship experience or preferably formal mentorship training

Legal Requirements:

- Compliant to all relevant labour relations and employment legislation
- Accredited with relevant authority
- Compliant with SHERQ requirements
- Any other statutory requirements relevant to the specific context

2.5 Additional Assignments to be Assessed Externally

None

671101000-WM-03, Processes of testing and inspecting electrical installations and control systems, L4, Cr15

3.1 Purpose of the Work Experience Module

The focus of the work experience is on providing the learner an opportunity to:
Gain exposure to work as part of a team in the processes of testing and inspecting of electrical equipment, control systems and installations in a real life electrical environment. The Learner will be required to successfully complete each Work Experience at least three (3) times.

The learner will be required to:
WM-03-WE01: Observe and assist a qualified person in the processes of testing and inspecting of electrical equipment, control systems and installations
WM-03-WE02: Processes of testing and inspecting of electrical equipment, control systems and installations under the direct supervision of a qualified person
WM-03-WE03: Undertake all activities without assistance, but under supervision, in the processes of testing and inspecting of electrical equipment, control systems and installations

Scope of Work Experience
The person will be expected to engage in the following work activities:
Measurements in AC (single and three phase) will include current, voltage, resistance and may include power, Energy, frequency, power factor.
Measurements in DC circuits will include current, voltage and resistance.
Learners will do the following tests: Insulation resistance between conductors, insulation resistance between conductors and earth, continuity of conductors, earth continuity, and earth leakage sensitivity test. The following tests may be included, Earth fault Loop impedance, Elevated voltage on neutral, On load and no load voltage, polarity, phase rotation, fault location test, earth resistance test

3.2 Guidelines for Work Experiences

3.2.1 WM-03-WE01: Observe and assist a qualified electrician in the processes of testing and inspecting of electrical equipment, control systems and installations

Scope of Work Experience
The person will be expected to engage in the following work activities:
WA0101 Visually and physically inspect electrical equipment

WA0102 Inspect protection devices selection and settings
WA0103 Test electrical equipment
WA0104 Test main and control circuits
WA0105 Visually and physically inspect installations
WA0106 Complete electrical tests
WA0107 Inspect the installation method used.
WA0108 Inspect the selection of cables and conductors.
WA0109 Document findings and test results

Supporting Evidence

SE0101 Completed observation checklist
SE0102 Completed section in logbook
SE0103 Completed electrical test report
.

3.2.2 WM-03-WE02: Test and inspect electrical equipment, control systems and installations under the direct supervision of a qualified electrician

Scope of Work Experience

Measurements in AC (single and three phase) will include current, voltage, resistance and may include power, Energy, frequency, power factor.
Measurements in DC circuits will include current, voltage and resistance.
Learners will do the following tests: Insulation resistance between conductors, insulation resistance between conductors and earth, continuity of conductors, earth continuity, and earth leakage sensitivity test. The following tests may be included, Earth fault Loop impedance, Elevated voltage on neutral, On load and no load voltage, polarity, phase rotation, fault location test, earth resistance test

The person will be expected to engage in the following work activities:

WA0201 Visually inspect electrical equipment
WA0202 Protection devises used in electrical equipment are inspected and settings verified
WA0203 Test electrical equipment
WA0204 Test main and control circuits
WA0205 Visually inspect installations
WA0206 Electrical tests are done
WA0207 Installation method used is inspected
WA0208 The selection of cables and conductors are inspected

WA0109 document findings and test results

Supporting Evidence

SE0201 Completed observation checklist

SE0202 Completed section in logbook

SE0203 Completed electrical test report

3.2.3 WM-03-WE03: Undertake all activities without assistance, but under supervision, in the processes of testing and inspecting of electrical equipment, control systems and installations

Scope of Work Experience

Measurements in AC (single and three phase) will include current, voltage, resistance and may include power, Energy, frequency, power factor.

Measurements in DC circuits will include current, voltage and resistance.

Learners will do the following tests: Insulation resistance between conductors, insulation resistance between conductors and earth, continuity of conductors, earth continuity, and earth leakage sensitivity test. The following tests may be included, Earth fault Loop impedance, Elevated voltage on neutral, On load and no load voltage, polarity, phase rotation, fault location test, earth resistance test

The person will be expected to engage in the following work activities:

WA0201 Complete a visual inspection of electrical equipment.

WA0202 Inspect protection devises used in electrical equipment and settings verified.

WA0203 Test electrical equipment and document results under the direct supervision of a qualified artisan

WA0204 Test main and control circuits

WA0205 Complete a visual inspection of installations.

WA0206 Complete and record electrical tests.

WA0207 Inspect the installation method used.

WA0208 Inspect the selection of cables and conductors.

WA0209 Document findings and test results

Supporting Evidence

SE0201 Completed observation checklist

SE0202 Completed section in logbook

SE0203 Completed electrical test report

3.3 Contextualised Workplace Knowledge

1. Company specific policies and procedures (LV operating procedures, lock-out procedures, risk assessment and safety procedures and environmental policies)
2. Company specific quality management systems
3. Relevant statutory requirements: Not limited to OHS Act; Construction Regulations; Mine Health and Safety Act, Municipal by-laws, environmental standards, traffic regulations, operating regulations for high voltage systems.
4. SANS standards
5. Manufacturers specification

3.4 Criteria for Workplace Approval

Physical Requirements:

Access to the following equipment

- Context: Mining
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase AC motors and general lighting, battery charging systems and associated medium voltage under dead conditions, underground cabling systems, trenched cable systems, direct current motors.

- Context Municipal
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase alternating current motors and general lighting, battery charging systems, metering systems and associated medium voltage and under dead conditions, street lighting, overhead line systems, trenched cable systems

- Context: Marine
- Transformers; distribution enclosures; distribution systems, floating earthing systems, metering units, , single phase and three phase AC motors and general lighting, battery charging systems and associated medium voltage under dead conditions, direct current motors.

- Context: Construction
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase AC motors and general lighting used

in domestic, industrial and emergency areas, trenched cable systems and metering systems.

- Context: Chemical environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase AC motors and general lighting used in domestic, industrial and emergency areas ,battery charging systems, metering systems, trenched cable systems

- Context: Metal and Manufacturing environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase AC motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, trenched cable systems, direct current motors.

- Context: Agricultural environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase AC motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, trenched cable systems, direct current motors.

- Context: Railway environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase AC motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, metering systems and associated medium voltage and HV switchgear under dead conditions ,to street lighting and stadium lighting, trenched cable systems, direct current motors.

- Context: Energy environments
- Transformers; distribution enclosures; distribution systems, earthing systems, metering units, , single phase and three phase AC motors and general lighting used in domestic, industrial and emergency areas , battery charging systems, metering systems and associated medium voltage and HV switchgear under dead conditions, street lighting and stadium lighting, overhead line systems;

Access to the following control systems

- Alternating and Direct current control systems that may include: load control systems, load distribution systems, network protection systems and pilot cables.
- AC control gear that includes isolators, contactors, overload relays, timers, circuit breakers, relays, stop/start/emergency stops, limit switches and may include DC control gear.
- Control gear will include star delta, three phase controls (DOL, Three phase forward reverse, and sequence starters), and may include dual speed controls, auto transformer starters, variable speed drives, programmable logic controllers, DC speed control and resistance starters.
- Context: The Municipal and Marine environments may have access to pilot cables and level, limits, pressure, temperature and proximity switching
- Context: The mining, marine, agriculture, metal and manufacturing, chemical and railway environments must have access to DC control gear.

Access to the following Installations:

- Context: Learners within the Construction environments may work within residential premises, commercial premises, public premises, industrial premises, prefabricated buildings, construction and demolition site installations, agricultural and horticultural premises, caravans, caravan sites and similar sites, exhibitions, fairs and other temporary installations, extra low voltage lighting installations.
- Context: Apprentices within the Municipal environments may work within commercial premises, public premises, exhibitions, and other temporary installations, electrical installations for street lighting and access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Mining environments may work within commercial premises, industrial premises, and fixed surface installations on mining properties, construction and demolition site installations access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Railway environments may work within commercial premises, industrial premises, marinas, pleasure craft and house boats marine platforms access to distribution system networks associated MV switchgear under dead conditions.

- Context: Learners within the Energy environments may work within commercial premises and industrial premises access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Marine environments may work within marinas, pleasure craft, house boats and marine platforms access to distribution system networks associated MV switchgear under dead conditions
- Context: Learners within the Agricultural environments may work within commercial premises, industrial premises, agricultural and horticultural premises.
- Context: Learners within the Manufacturing and steel environments may work commercial premises access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Chemical environments may work commercial premises, access to distribution system networks associated MV switchgear under dead conditions
- Tools and equipment to conduct occupational tasks
- The physical resources in terms of tools, equipment, systems, conditions and interfaces that the workplace must have to ensure that learners can participate in all work activities.

Human Resource Requirements:

- A qualified person with at least 3 years relevant experience working within an electrical-related industry which includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent
- Workplace coach: learner ratio 1 to 2
- A person with mentorship experience or preferably formal mentorship training

Legal Requirements:

- Compliant to all relevant labour relations and employment legislation
- Accredited with relevant authority
- Compliant with SHERQ requirements
- Any other statutory requirements relevant to the specific context

3.5 Additional Assignments to be Assessed Externally

None

671101000-WM-04, Processes of commissioning electrical installations and control systems, L4, Cr15

4.1 Purpose of the Work Experience Module

The focus of the work experience is on providing the learner an opportunity to:
Gain exposure to work as part of a team in the processes of commissioning electrical installations and control systems in a real life electrical environment. The Learner will be required to successfully complete each Work Experience at least three (3) times.

The learner will be required to:
WM-04-WE01: Observe and assist a qualified person in the processes of commissioning electrical installations and control systems
WM-04-WE02: Processes of commissioning electrical installations and control systems under the direct supervision of a qualified person
WM-04-WE03: Undertake all activities without assistance, but under supervision, to commission electrical installations and control systems

4.2 Guidelines for Work Experiences

4.2.1 WM-04-WE01: Observe and assist a qualified person in the processes of commissioning electrical installations and control systems

Scope of Work Experience

The person will be expected to engage in the following work activities:
WA0101 Implement safety procedures prior to commissioning
WA0102 Perform functionality testing
WA0103 Monitor instrument readings
WA0104 Rectify defects found
WA0105 Complete a commissioning report
WA0106 Hand over the installation

Supporting Evidence

SE0101 Completed checklists
SE0102 Completed section in Logbook

4.2.2 WM-04-WE02: Commission electrical installations and control systems under the direct supervision of a qualified electrician

Scope of Work Experience

The person will be expected to engage in the following work activities:

WA0201 Implement safety procedures prior to commissioning

WA0202 Perform functionality testing

WA0203 Monitor instrument readings

WA0204 Rectify defects found

WA0205 Complete a commissioning report

WA0206 Hand over the installation

Supporting Evidence

SE0201 Completed checklists

SE0202 Completed section in Logbook

4.2.3 WM-04-WE03: Undertake all activities without assistance, but under supervision, to commission electrical installations and control systems

Scope of Work Experience

The person will be expected to engage in the following work activities:

WA0201 Implement safety procedures prior to commissioning

WA0202 Perform functionality testing

WA0203 Monitor instrument readings

WA0204 Rectify defects found

WA0205 Complete a commissioning report

WA0206 Hand over the installation

Supporting Evidence

SE0201 Completed checklists

SE0202 Completed section in Logbook

4.3 Contextualised Workplace Knowledge

1 Company specific policies and procedures (LV operating procedures, lock-out procedures, risk assessment and safety procedures and environmental policies)

2 Company specific quality management systems

3 Relevant statutory requirements: Not limited to OHS Act; Construction Regulations; Mine Health and Safety Act, Municipal by-laws, environmental standards, traffic regulations, operating regulations for high voltage systems.

4 SANS standards

5 Manufacturerõs specification

4.4 Criteria for Workplace Approval

Physical Requirements:

Access to the following control systems

- Alternating and Direct current control systems that may include: load control systems, load distribution systems, network protection systems and pilot cables.
- AC control gear that includes isolators, contactors, overload relays, timers, circuit breakers, relays, stop/start/emergency stops, limit switches and may include DC control gear.
- Control gear will include star delta, three phase controls (DOL, Three phase forward reverse, and sequence starters), dual speed controls, auto transformer starters, and may include variable speed drives, programmable logic controllers, DC speed control and resistance starters.
- Context: The Municipal and Marine environments must have access to pilot cables and level, limits, pressure, temperature and proximity switching
- Context: The mining, marine, agriculture, metal and manufacturing, chemical and railway environments must have access to DC control gear.

Access to the following Installations:

- Context: Learners within the Construction environments may work within residential premises, commercial premises, public premises, industrial premises, prefabricated buildings, construction and demolition site installations, agricultural and horticultural premises, caravans, caravan sites and similar sites, exhibitions, fairs and other temporary installations, extra low voltage lighting installations.
- Context: Apprentices within the Municipal environments may work within commercial premises, public premises, exhibitions, and other temporary installations, electrical installations for street lighting and access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Mining environments may work within commercial premises, industrial premises, and fixed surface installations on mining properties,

construction and demolition site installations access to distribution system networks associated MV switchgear under dead conditions.

- Context: Learners within the Railway environments may work within commercial premises, industrial premises, marinas, pleasure craft and house boats marine platforms access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Energy environments may work within commercial premises and industrial premises access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Marine environments may work within marinas, pleasure craft, house boats and marine platforms access to distribution system networks associated MV switchgear under dead conditions
- Context: Learners within the Agricultural environments may work within commercial premises, industrial premises, agricultural and horticultural premises.
- Context: Learners within the Manufacturing and steel environments may work commercial premises access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Chemical environments may work commercial premises, access to distribution system networks associated MV switchgear under dead conditions
- Tools and equipment to conduct occupational tasks
- The physical resources in terms of tools, equipment, systems, conditions and interfaces that the workplace must have to ensure that learners can participate in all work activities.

Human Resource Requirements:

- A qualified person with at least 3 years relevant experience working within an electrical-related industry which includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent
- Workplace coach: learner ratio 1 to 2
- A person with mentorship experience or preferably formal mentorship training

Legal Requirements:

- Compliant to all relevant labour relations and employment legislation
- Accredited with relevant authority

- Compliant with SHERQ requirements
- Any other statutory requirements relevant to the specific context

4.5 Additional Assignments to be Assessed Externally

None

671101000-WM-05, Maintenance processes for equipment, control systems and electrical installations, L4, Cr3644

5.1 Purpose of the Work Experience Module

The focus of the work experience is on providing the learner an opportunity to:
Gain exposure to work as part of a team in the maintenance processes for equipment, control systems and electrical installations in a real life electrical environment. The Learner will be required to successfully complete each Work Experience at least three (3) times.

The learner will be required to:
WM-05-WE01: Observe and assist a qualified person in the maintenance processes for equipment, control systems and electrical installations
WM-05-WE02: Maintenance processes for equipment, control systems and electrical installations under the direct supervision of a qualified person
WM-05-WE03: Undertake all activities without assistance, but under supervision, in maintenance processes for equipment, control systems and electrical insta5.2 Guidelines for Work Experiences

5.2.1 WM-05-WE01: Observe and assist a qualified electrician in the maintenance processes for equipment, control systems and electrical installations

Scope of Work Experience

The person will be expected to engage in the following work activities:
WA0101 isolate and lockout equipment, control systems and installations
WA0102 clean and prepare equipment for maintenance
WA0103 implement maintenance schedules
WA0104 perform faultfinding on installations
WA0105 repair defects
WA0106 complete a maintenance report
WA0107 re-commission and hand over the installation

Supporting Evidence

SE0101 Completed observation checklist
SE0102 Completed section in logbook

5.2.2 WM-05-WE02: Maintain equipment, control systems and electrical installations under the direct supervision of a qualified electrician

Scope of Work Experience

The person will be expected to engage in the following work activities:

WA0201 isolate and lockout equipment, control systems and installations

WA0202 clean and prepare equipment for maintenance

WA0203 implement maintenance schedules

WA0204 perform faultfinding on installations

WA0205 repair defects

WA0206 complete a maintenance report

WA0207 re-commission and hand over the installation

Supporting Evidence

SE0201 Signed off work orders

SE0202 Completed checklists

SE0203 Work permits/workers register

5.2.3 WM-05-WE03: Undertake all activities without assistance, but under supervision, in maintenance processes for equipment, control systems and electrical installations

Scope of Work Experience

The person will be expected to engage in the following work activities:

WA0301 isolate and lockout equipment, control systems and installations

WA0302 clean and prepare equipment for maintenance

WA0303 implement maintenance schedules

WA0304 perform faultfinding on installations

WA0305 repair defects

WA0306 complete a maintenance report

WA0307 re-commission and hand over the installation

Supporting Evidence

SE0301 Signed off work orders

SE0302 Completed checklists

SE0303 Re-commission and hand over the installation

5.3 Contextualised Workplace Knowledge

1. Company specific policies and procedures (LV operating procedures, lock-out procedures, risk assessment and safety procedures and environmental policies)
2. Company specific quality management systems

3. Relevant statutory requirements: Not limited to OHS Act; Construction Regulations; Mine Health and Safety Act, Municipal by-laws, environmental standards, traffic regulations, operating regulations for high voltage systems.
4. SANS standards
5. Manufacturerõs specification

5.4 Criteria for Workplace Approval

Physical Requirements:

Access to the following equipment

- Alternating and Direct current control systems that may include: load control systems, load distribution systems, network protection systems and pilot cables.
- AC control gear that includes isolators, contactors, overload relays, timers, circuit breakers, relays, stop/start/emergency stops, limit switches and may include DC control gear.
- Control gear will include star delta, three phase controls (DOL, Three phase forward reverse, and sequence starters), dual speed controls, auto transformer starters, and may include variable speed drives, programmable logic controllers, DC speed control and resistance starters.
- Context: The Municipal and Marine environments must have access to pilot cables and level, limits, pressure, temperature and proximity switching
- Context: The mining, marine, agriculture, metal and manufacturing, chemical and railway environments must have access to DC control gear.

Access to the following Installations:

- Context: Learners within the Construction environments may work within residential premises, commercial premises, public premises, industrial premises, prefabricated buildings, construction and demolition site installations, agricultural and horticultural premises, caravans, caravan sites and similar sites, exhibitions, fairs and other temporary installations, extra low voltage lighting installations.
- Context: Apprentices within the Municipal environments may work within commercial premises, public premises, exhibitions, and other temporary installations, electrical installations for street lighting and access to distribution system networks associated MV switchgear under dead conditions.

- Context: Learners within the Mining environments may work within commercial premises, industrial premises, and fixed surface installations on mining properties, construction and demolition site installations access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Railway environments may work within commercial premises, industrial premises, marinas, pleasure craft and house boats marine platforms access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Energy environments may work within commercial premises and industrial premises access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Marine environments may work within marinas, pleasure craft, house boats and marine platforms access to distribution system networks associated MV switchgear under dead conditions
- Context: Learners within the Agricultural environments may work within commercial premises, industrial premises, agricultural and horticultural premises.
- Context: Learners within the Manufacturing and steel environments may work commercial premises access to distribution system networks associated MV switchgear under dead conditions.
- Context: Learners within the Chemical environments may work commercial premises, access to distribution system networks associated MV switchgear under dead conditions
- Tools and equipment to conduct occupational tasks
- The physical resources in terms of tools, equipment, systems, conditions and interfaces that the workplace must have to ensure that learners can participate in all work activities.

Human Resource Requirements:

- A qualified person with at least 3 years relevant experience working within an electrical-related industry which includes competencies related to installing, testing, connecting, commissioning, maintaining and altering/repairing electrical equipment, wiring and control systems or equivalent
- Workplace coach: learner ratio 1 to 2
- A person with mentorship experience or preferably formal mentorship training

Legal Requirements:

- Compliant to all relevant labour relations and employment legislation
- Accredited with relevant authority
- Compliant with SHERQ requirements
- Any other statutory requirements relevant to the specific context

5.5 Additional Assignments to be Assessed Externally

None

SECTION 4: STATEMENT OF WORK EXPERIENCE

STATEMENTS OF WORK EXPERIENCE

Curriculum Number:	671101000
Curriculum Title:	Occupational Certificate: Electrician

Learner Details	
Name:	
ID Number:	

Employer Details	
Company Name:	
Address:	
Supervisor Name:	
Work Telephone:	
E-Mail:	

671101000-WM-01, Planning and preparation process for the wiring, connection, testing, inspecting, commissioning and maintaining of electrical installations and control systems, L4, Cr8

WM-01-WE01	Observe and assist a qualified person in the planning and preparation process for electrical installations and control systems	Date	Signature
	Work Activities		
WA0101	Obtaining relevant documentation and completing requisition/order		
WA0102	Obtaining drawings in order to determine job requirements		
WA0103	Obtaining tools and equipment from stores and to ensure transportation to worksite		
WA0104	Checking worksite for safety and risk analysis requirements		
	Supporting Evidence		
SE0101	Obtained and signed requisition/order documentation by both learner and a qualified person		
SE0102	Signed job card by both learner and a qualified person		
SE0103	Signed workplace log or other relevant documentation to indicate number of hours spent by both learner and a qualified person		
SE0104	Signed off completed risk assessment checklist by both learner and a qualified person		

WM-01-WE02	Plan and prepare for electrical installations and control systems under the direct supervision of a qualified person	Date	Signature

	Work Activities		
WA0201	Obtain relevant documentation and complete requisition		
WA0202	Obtain drawings in order to determine job requirements under		
WA00203	Obtain tools and equipment from stores and ensure transportation to worksite		
WA0204	Checking worksite for safety and risk analysis requirements		
	Supporting Evidence		
SE0201	Obtained and signed requisition/order documentation by both learner and a qualified person		
SE0202	Signed job card by both learner and a qualified person		
SE0203	Signed workplace log or other relevant documentation to indicate number of hours spent by both learner and a qualified person		
SE0204	Signed off completed risk assessment checklist by both learner and a qualified person		

WM-01-WE03	Undertake all activities without assistance, but under supervision, to plan and prepare for electrical installations	Date	Signature
	Work Activities		
WA0301	Obtain relevant documentation and complete requisition/order		
WA0302	Obtain drawings in order to determine job requirements		
WA0303	Obtain tools and equipment from stores and ensure transportation to worksite		

WA0304	Checking worksite for safety and risk analysis requirements		
	Supporting Evidence		
SE0301	Obtained and signed requisition/order documentation as verified by a signature from a qualified person		
SE0302	Signed job card as verified by a signature from a qualified person		
SE0303	Signed workplace log or other relevant documentation to indicate number of hours spent as verified by a signature from a qualified person		
SE0304	Signed off completed risk assessment checklist as verified by a signature from a qualified person		

	Contextualised Workplace Knowledge		
1	Company specific policies and procedures		
2	Company specific quality management systems		
3	Relevant sections of the Occupational Health and Safety Act		
4	ISO standards		
5	SANS standards		
6	Manufacturers specification		
	Additional Assignments to be Assessed Externally		
1	None		

671101000-WM-02, Processes of installing, wiring and connecting of electrical equipment and control systems, L4, Cr74

WM-02-WE01	Observe and assist a qualified electrician in the processes of installation, wiring and connection of electrical equipment and control systems	Date	Signature
	Work Activities		
WA0101	To apply drawing specifications		
WA0102	To use access to height equipment		
WA0103	To mark out and do measurements of the installation		
WA0104	To drill and/ tap and/or chase walls and/or trenching		
WA0105	To install and secure wire ways		
WA0106	To mount and fasten equipment		
WA0107	To draw in conductors and cables		
WA0108	To make off cables		
WA0109	To terminate cables and conductors		
WA0110	To label and number cables and conductors		
	Supporting Evidence		
SE0101	Completed observation checklist		
SE0102	Completed section in logbook		
SE0103	List of equipment installed		

WM-02-WE02	Install, wire and connect electrical equipment and control systems under the direct supervision of a qualified electrician	Date	Signature
	Work Activities		
WA0201	Application of drawing specifications		
WA0202	Use access equipment		
WA0203	Mark out and do measurements of the site		

WA0204	Drill and/ tap and/chase walls and/complete trenches		
WA0205	Install and secure wire ways		
WA0206	Draw in conductors and cables		
WA0207	Make off cables		
WA0208	Terminate cables and conductors		
WA0209	Label and number cables and conductors		
	Supporting Evidence		
SE0201	Completed observation checklist		
SE0202	Completed section in logbook		
SE0203	List of equipment installed		

WM-02-WE03	Undertake all activities without assistance, but under supervision, to install, wire and connect electrical equipment and control systems	Date	Signature
	Work Activities		
WA0301	Apply drawing specifications.		
WA0302	Select and use access equipment		
WA0303	Mark out and do measurements of the site		
WA0304	Drill and/ tap and/or chase walls and/or trenching		
WA0305	Install and secure wire ways		
WA0305	Mount and fasten equipment		
WA0306	Draw in conductors and cables		
WA0307	Make off cables		
WA0308	Terminate cables and conductors		
	Supporting Evidence		
SE0301	Completed observation checklist		
SE0302	Completed section in logbook		
SE0303	List of equipment installed		

	Contextualised Workplace Knowledge		
1	Company specific policies and procedures (LV operating procedures, lock-out procedures, risk assessment and safety procedures and environmental policies)		

2	Company specific quality management systems		
3	Relevant statutory requirements: Not limited to OHS Act; Construction Regulations; Mine Health and Safety Act, Municipal by-laws, environmental standards, traffic regulations, operating regulations for high voltage systems.		
4	SANS standards		
5	Manufacturers specification		
	Additional Assignments to be Assessed Externally		
1	None		

671101000-WM-03, Processes of testing and inspecting electrical installations and control systems, L4, Cr15

WM-03-WE01	Observe and assist a qualified electrician in the processes of testing and inspecting of electrical equipment, control systems and installations	Date	Signature
	Work Activities		
WA0101	visually and physically inspect electrical equipment		
WA0102	inspect protection devices selection and settings		
WA0103	test electrical equipment		
WA0104	test main and control circuits		
WA0105	visually and physically inspect installations		
WA0106	complete electrical tests		
WA0107	Inspect the installation method used.		
WA0108	Inspect the selection of cables and conductors.		
WA0109	document findings and test results		
	Supporting Evidence		
SE0101	Completed observation checklist		
SE0102	Completed section in logbook		
SE0103	Completed electrical test report		

WM-03-WE02	Test and inspect electrical equipment, control systems and installations under the direct supervision of a qualified electrician	Date	Signature
	Work Activities		
WA0201	Visually inspect electrical equipment		
WA0202	Protection devises used in electrical equipment are inspected and settings verified		
WA0203	Test electrical equipment		
WA0204	test main and control circuits		
WA0205	Visually inspect installations		
WA0206	Electrical tests are done		
WA0207	Installation method used is inspected		
WA0208	The selection of cables and conductors are		

	inspected		
WA0209	document findings and test results		
	Supporting Evidence		
SE0201	Completed observation checklist		
SE0202	Completed section in logbook		
SE0203	Completed electrical test report		

WM-03-WE03	Undertake all activities without assistance, but under supervision, in the processes of testing and inspecting of electrical equipment, control systems and installations	Date	Signature
	Work Activities		
WA0201	Complete a visual inspection of electrical equipment.		
WA0202	Inspect protection devises used in electrical equipment and settings verified.		
WA0203	Test electrical equipment and document results under the direct supervision of a qualified artisan		
WA0204	Test main and control circuits		
WA0205	Complete a visual inspection of installations.		
WA0206	Complete and record electrical tests.		
WA0207	Inspect the installation method used.		
WA0208	Inspect the selection of cables and conductors.		
WA0209	document findings and test results		
	Supporting Evidence		
SE0201	Completed observation checklist		
SE0202	Completed section in logbook		
SE0203	Completed electrical test report		

	Contextualised Workplace Knowledge		
1	Company specific policies and procedures		
2	Company specific quality management systems		
3	Relevant sections of the Occupational Health and Safety Act		
4	ISO standards		

	SANS standards		
5	Manufacturers specification		
	Additional Assignments to be Assessed Externally		
1	None		

671101000-WM-04, Processes of commissioning electrical installations and control systems, L4, Cr15

WM-04-WE01	Observe and assist and experienced bricklayer with the brick laying processes to construct, repair and/or make alterations to superstructures within the construction environment	Date	Signature
	Work Activities		
WA0101	implement safety procedures prior to commissioning		
WA0102	perform functionality testing		
WA0103	monitor instrument readings		
WA0104	rectify defects found		
WA0105	complete a commissioning report		
WA0106	hand over the installation		
	Supporting Evidence		
SE0101	Completed checklists		
SE0102	Completed section in Logbook		

WM-04-WE02	Commission electrical installations and control systems under the direct supervision of a qualified electrician	Date	Signature
	Work Activities		
WA0201	implement safety procedures prior to commissioning		
WA0202	perform functionality testing		
WA0203	monitor instrument readings		
WA0204	rectify defects found		
WA0205	complete a commissioning report		
WA0206	hand over the installation		
	Supporting Evidence		
SE0201	Completed checklists		
SE0202	Completed section in Logbook		

WM-04-WE03	Undertake all activities without assistance, but under supervision, to commission electrical	Date	Signature

	installations and control systems		
	Work Activities		
WA0201	implement safety procedures prior to commissioning		
WA0202	perform functionality testing		
WA0203	monitor instrument readings		
WA0204	rectify defects found		
WA0205	complete a commissioning report		
WA0206	hand over the installation		
	Supporting Evidence		
SE0201	Completed checklists		
SE0202	Completed section in Logbook		

	Contextualised Workplace Knowledge		
1	Company specific policies and procedures		
2	Company specific quality management systems		
3	Relevant sections of the Occupational Health and Safety Act		
4	ISO standards		
5	SANS standards		
6	Manufacturers specification		
	Additional Assignments to be Assessed Externally		
1	None		

671101000-WM-05, Maintenance processes for equipment, control systems and electrical installations, L4, Cr44

WM-05-WE01	Observe and assist a qualified electrician in the maintenance processes for equipment, control systems and electrical installations	Date	Signature
	Work Activities		
WA0101	isolate and lockout equipment, control systems and installations		
WA0102	clean and prepare equipment for maintenance		
WA0103	implement maintenance schedules		
WA0104	perform faultfinding on installations		
WA0105	repair defects		
WA0106	complete a maintenance report		
WA0107	re-commission and hand over the installation		
	Supporting Evidence		
SE0101	Completed observation checklist		
SE0102	Completed section in logbook		

WM-05-WE02	Maintain equipment, control systems and electrical installations under the direct supervision of a qualified electrician	Date	Signature
	Work Activities		
WA0201	isolate and lockout equipment, control systems and installations		
WA0202	clean and prepare equipment for maintenance		
WA0203	implement maintenance schedules		
WA0204	perform faultfinding on installations		
WA0205	repair defects		
WA0206	complete a maintenance report		
WA0207	re-commission and hand over the installation		
	Supporting Evidence		
SE0201	Signed off work orders		
SE0202	Completed checklists		
SE0203	Work permits/workers register		

WM-05-WE03	Undertake all activities without assistance, but under supervision, in maintenance processes for equipment, control systems and electrical installations	Date	Signature
	Work Activities		
WA0301	isolate and lockout equipment, control systems and installations		
WA0302	clean and prepare equipment for maintenance		
WA0303	implement maintenance schedules		
WA0304	perform faultfinding on installations		
WA0305	repair defects		
WA0306	complete a maintenance report		
WA0307	re-commission and hand over the installation		
	Supporting Evidence		
SE0301	Signed off work orders		
SE0302	Completed checklists		
SE0303	Re-commission and hand over the installation		

	Contextualised Workplace Knowledge		
1	Company specific policies and procedures		
2	Company specific quality management systems		
3	Relevant sections of the Occupational Health and Safety Act		
4	ISO standards		
5	SANS standards		
6	Manufacturers specification		
	Additional Assignments to be Assessed Externally		
1	None		