Quality Council for Trades & Occupations
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OCCUPATIONAL SKILLS PROGRAMME CURRICULUM DOCUMENT

IN LINE WITH THE OQSF POLICY (2021) OCCUPATIONAL QUALIFICATION TYPE (NOMENCLATURE)

QUALIFICATION/PART-QUALIFICATION/SKILLS PROGRAMME	SKILLS PROGRAMME ID	TITLE (DESCRIPTOR)	NQF LEVEL	CREDITS
Skills Programme	SP-250124	Micro-Biogas Digester Constructor	4	50
CURRICULUM CODE	900293-000-00-00			
PARTNER DETAILS	**ORGANISATION NAME**	**WEBSITE ADDRESS**	**TELEPHONE NUMBER**	**LOGO**
QUALITY PARTNER - DEVELOPMENT	The Energy & Water Sector Education Training Authority (EWSETA)	www.ewseta.org.za	011 274 4700	

Contents

SECTION 1: CURRICULUM SUMMARY

1.1 Occupational Information:

1.1.1 Associated, Organising Framework for Occupations (OFO) Occupational Code and Title

311101 Biofuels Processing Technician

1.1.2 Occupation/Specialisation/Part-Qualification/Skills Programme Type, Title, NQF Level, Credits and Curriculum Code, addressed by this Curriculum.

TYPE	TITLE	NQF LEVEL	CREDITS	CURRICULUM CODE
Skills Programme	Micro-Biogas Digester Constructor	4	50	900293-000-00-00

1.1.3 Alternative titles used by industry:

Micro-biodigester Technician

1.2 Curriculum Information:

1.2.1 Articulation for Qualifications and Part- Qualifications

Not applicable

1.2.2 Articulation for Skills programmes

(a) Work Opportunities:

Employment as:

- Community biogas project initiator
- Micro-biogas digester developer/installer

(b) Learning Opportunities:

Successful learners may pursue further learning in the following occupation(s):

- Renewable energy

1.3 Curriculum Structure:

1.3.1 Knowledge/Theory Modules:

- 900293-000-00-KM-01, Basics of Biogas Generation and Installation of a Micro-biodigester, NQF Level 4, Credits 2

Total number of credits: 2

1.3.2 Practical Skills Modules:

Practical Skill Modules:

- 900293-000-00-PM-01, Construct the civil structure of a fixed dome brick and mortar digester, pre-manufacturer ballon type digester and pre-manufactured rotor moulded plastic micro-biodigester, NQF Level 4, Credits 36
- 900293-000-00-PM-02, Install pipeline, appliances and electro-mechanical components, NQF Level 4, Credits 8
- 900293-000-00-PM-03, Operate and maintain fixed dome, ballon type or pre-manufactured plastic type micro-biodigesters, NQF Level 4, Credits 4

Total number of credits: 48

1.4 Entry Requirements:

NQF Level 3 qualification in bricklaying

1.5 Recognition of Prior Learning (RPL):

1.5.1 RPL for Access:

NB: QCTO Standard Statement Provided

Learners may use the RPL process to gain access to training opportunities for a skills programme if they do not meet the formal, minimum entry requirements for admission. RPL assessment provides an alternative access route into a skills programme.
Such an RPL assessment may be developed, moderated and conducted by the accredited Skills Development Provider which offers that specific skills programme. Such an assessment must ensure that the learner is able to display the equivalent level of competencies required for access, based on the NQF level descriptors.

1.5.2 RPL for Exemption:

NB: QCTO Standard Statement Provided

For exemption from modules through RPL, learners who have gained the stipulated competencies of the modules of a skills programme through any means of formal, informal or non-formal learning and/or work experience, may be awarded credits towards relevant modules, and gaps identified for training, which is then concluded.

1.5.3 RPL for awarding credits:

NB: QCTO Standard Statement Provided

Learners who have gained the stipulated competencies of the modules of a skills programme through any means of formal, informal or non-formal learning and/or work experience, may be awarded credits towards relevant modules, and gaps identified for training, which is then concluded.

For a Skills Programme, the accredited Skills Development Provider (SDP) must ensure all modular competency requirements are met prior to the FISA and keep record of such evidence.
Upon successful completion of the FISA, RPL learners will be issued with the QCTO certificate for the skills programme. Quality Partners are responsible for ensuring the RPL mechanism and process for skills programme is approved by the QCTO.

1.6 Quality Partner for Assessment:

NAME OF BODY:	N/A
ADDRESS OF BODY:	
WEBSITE:	
TELEPHONE NUMBER:	

1.7 List of Qualification(s)/Part- Qualification(s)/Skills Programme(s) Related to this Curriculum

Micro-Biogas Digester Constructor

SECTION 2: OCCUPATIONAL/SPECIALISATION/PART-QUALIFICATION/SKILLS PROGRAMME PROFILE

2.1 Purpose:

A Micro-Biogas Digester Constructor sizes, constructs and installs a micro-biodigester and components for the installation, operation and maintenance of biogas production by monitoring operations, performing routine maintenance tasks, collecting data, identifying and troubleshooting problems and implementing safety protocols and procedures.

2.2 Tasks:

TASK	LINKS TO ELO
Size, construct and install micro-biodigester and components	Use a variety of common tools and instruments to construct and install micro-biodigesters and components safely within a supervised environment
Operate, maintain and monitor micro-biodigester	Apply common methods and solutions to operate, maintain and monitor micro-biodigester, taking cognisance of consequences of related actions

2.3 Occupational Task Details:

2.3.1 Task 1

Size, construct and install micro-biodigester and components

(a) Unique Product or Service:

Functional micro-biodigester

(b) Responsibilities:

- Construct the civil structure of a fixed dome brick and mortar digester, pre-manufacturer ballon type digester and pre-manufactured rotor moulded plastic micro-biodigester
- Install pipeline, appliances and electro-mechanical components

2.3.2 Task 2

Operate, monitor and maintain micro-biodigester

(a) Unique Product or Service:

Safe and effective biogas production

(b) Responsibilities:

- Operate and maintain fixed dome, ballon type or pre-manufactured plastic type micro-biodigesters

2.4 Qualification outline

900293-000-00-KM-01, Basics of Biogas Generation and Installation of a Micro-biodigester, NQF Level 4, Credits 2

Soft Skills Modules:

Eight percent (8%) of Soft skills is included in the following modules: PM-03

Task 1: Size, construct and install micro-biodigester and components **ELO 1. Use a variety of common tools and instruments to construct and install micro-biodigesters and components safely within a supervised environment.**	
Knowledge Modules	**Practical Modules**
900293-000-00-KM-01, Basics of Biogas Generation and Installation of a Micro-biodigester, NQF Level 4, Credits 2	900293-000-00-PM-01, Construct the civil structure of a fixed dome brick and mortar digester, pre-manufacturer ballon type digester and pre-manufactured rotor moulded plastic micro-biodigester, NQF Level 4, Credits 36
	900293-000-00-PM-02, Install pipeline, appliances and electro-mechanical components, NQF Level 4, Credits 8

Associated Assessment Criteria for Exit Level Outcome 1:

- A fixed dome brick and mortar digester is constructed using construction tools and equipment
- Pipeline, micro-biodigester appliances and electro-mechanical components are installed following the occupational health and safety protocols and procedures

Task 2: Operate and maintain micro-biodigester operations **ELO 2. Apply common methods and solutions to operate, maintain and monitor micro-biodigester, taking cognisance of consequences of related actions.**	
Knowledge Modules	**Practical Modules**

900293-000-00-KM-01, Basics of Biogas Generation and Installation of a Micro-biodigester, NQF Level 4, Credits 2	900293-000-00-PM-03, Operate and maintain fixed dome, ballon type or pre-manufactured plastic type micro-biodigesters, NQF Level 4, Credits 4

Associated Assessment Criteria for Exit Level Outcome 2:

- The basics of biogas generation are applied during the installation of micro-biodigesters
- Micro-biodigesters are operated and maintained for efficient functioning

SECTION 3: CURRICULUM COMPONENT SPECIFICATIONS

3 Knowledge Module Specifications:

NB: MODE OF DELIVERY e.g. face-to-face/contact, online, e-learning, mobile training unit, blended, distance, etc

MODULE CODE	MODULE TITLE	NQF LEVEL	CREDITS	MODE OF DELIVERY
900293-000-00-KM-01	Basics of Biogas Generation and Installation of a Micro-biodigester	4	2	Face-to-face or blended

Detailing Knowledge Module (KM) contents

3.1 Knowledge Module (KM) – 01: 900293-000-00-KM-01, Basics of Biogas Generation and Installation of a Micro-biodigester, NQF Level 4, Credits 2

NB: Add title level and Credits above

MODULE CODE	MODULE TITLE	NQF LEVEL	CREDITS	MODE OF DELIVERY
900293-000-00-KM-01	Basics of Biogas Generation and Installation of a Micro-biodigester	4	2	Face-to-face or blended

3.1.1 Module Details:

(a) Purpose of Knowledge Module:

The main focus of the learning in this subject is to familiarise learners with the biogas generation process, the importance of micro-biodigesters and the prerequisites for installing a fixed dome micro-biodigester.

The learning will enable learners to demonstrate an understanding of the topics listed below.

(b) List of Knowledge Topics:

TOPIC CODE	TOPIC TITLE	% OF TIME TO BE SPENT
KM-01-KT01	Prerequisites for biogas generation	5
KM-01-KT02	Types, functioning/working and benefits of micro-biodigesters	35
KM-01-KT03	Fundamentals of drawings	40
KM-01-KT04	Construction materials and quality standards	5
KM-01-KT05	Criteria for the selection of the construction site	5
KM-01-KT06	Principles of constructing a fixed dome micro-biodigester	10

(c) Detailing each topic listed above into topic elements:

KM-01-KT01 Prerequisites for biogas generation 5%		
TOPIC ELEMENT CODE	**TOPIC ELEMENT TITLE**	**% OF TIME TO BE SPENT**
KT0101	Basic waste-to-energy concept	20
KT0102	Ideal conditions for biogas generation	20

KT0103	Characteristics of biogas	20
KT0104	Inputs (feeding materials) for micro-biodigesters	20
KT0105	Effect of temperature and other parameters like C:N ratio, pH, etc. on biogas generation	20

Internal Assessment Criteria (IAC) and Weight

IAC CODE	IAC DESCRIPTION	% OF TIME TO BE SPENT
IAC0101	Explain and discuss methods of biogas production	20
IAC0102	Explain and discuss different types of inputs (feeding materials) for micro-biodigesters	20
IAC0103	Explain and discuss the merits and demerits of different feeding Materials	20
IAC0104	Describe why cattle dung is one of the biogas digester best feeding material for the South African context	20
IAC0105	Explain and discuss ideal conditions for biogas generation	10
IAC0106	Describe the effects of temperature on biogas generation	10

KM-01-KT02 Types, functioning/working and benefits of micro-biodigesters 35%		
TOPIC ELEMENT CODE	**TOPIC ELEMENT TITLE**	**% OF TIME TO BE SPENT**
KT0201	Types of micro-biodigesters	20
KT0202	Working principle of a micro-biodigester	20
KT0203	Model selection criteria	20
KT0204	Most practical applications of biogas produced (cooking, heating and generation of electricity)	20
KT0205	Benefits of micro-biodigesters and importance of the technology in South Africa	20

Internal Assessment Criteria (IAC) and Weight

IAC CODE	IAC DESCRIPTION	% OF TIME TO BE SPENT
IAC0201	Describe different types of micro-biodigesters and their strengths and weaknesses	10
IAC0202	Explain and discuss the components of a fixed dome micro-biodigester and the function(s) of each component	10
IAC0203	Explain and discuss the inter-relations of different components of a fixed dome micro-biodigester	20

IAC0204	Describe the criteria for selecting a particular model of fixed dome micro-biodigesters	20
IAC0205	Explain and discuss the suitability of fixed dome designs for electricity generation	10
IAC0206	Compare the benefits of other types of digesters also covered in this training (balloon type and other pre-manufactured plastic digesters)	10
IAC0207	Explain and discuss the products of a micro-biodigester, end-use applications of biogas and advantages of bio-slurry over Farmyard Manure (FYM)	10
IAC0208	Explain and discuss the benefits of biogas at the household and community level and why micro-biodigester technology is essential for South Africa	10

KM-01-KT03 Fundamentals of drawings 40%		
TOPIC ELEMENT CODE	**TOPIC ELEMENT TITLE**	**% OF TIME TO BE SPENT**
KT0301	Concepts and principles of reading basic drawings	35
KT0302	Principles of interpreting drawings of fixed dome micro-biodigesters	35
KT0303	Principles of interpreting drawings of templates, appliances, pipes and fittings and filter systems	30

Internal Assessment Criteria (IAC) and Weight

IAC CODE	**IAC DESCRIPTION**	**% OF TIME TO BE SPENT**
IAC0301	Describe and discuss the importance and the concept of plan, elevation and sections while preparing drawings	10
IAC0302	Explain and discuss the concept of the South African metric system of measurement	10
IAC0303	Demonstrate ability to distinguish different types of drawings	20
IAC0304	Describe the dimensions of various components of a fixed dome micro-biodigester	20
IAC0305	Define plan, section, isometric view, and half-sectional elevation of micro-biodigesters	20
IAC0306	Describe the interrelationship of various components of a micro-biodigester	10
IAC0307	Discuss the design principles and their relevance to a fixed dome digester and compare with other types of micro digesters	10

KM-01-KT04 Construction materials and quality standards 5%

TOPIC ELEMENT CODE	TOPIC ELEMENT TITLE	% OF TIME TO BE SPENT
KT0401	Types of construction materials for constructing a fixed dome micro-biodigester	50
KT0402	Quality standards of construction materials	50

Internal Assessment Criteria (IAC) and Weight

IAC CODE	IAC DESCRIPTION	% OF TIME TO BE SPENT
IAC0401	Explain and discuss the type of construction materials needed for construction and the importance of quality standards of materials	100

KM-01-KT05 Criteria for the selection of the construction site 5%		
TOPIC ELEMENT CODE	**TOPIC ELEMENT TITLE**	**% OF TIME TO BE SPENT**
KT0501	Impact of distance of micro-biodigester from feedstock source and point of use of the biogas	20
KT0502	Effect of temperature on biogas production	20
KT0503	Effect of longer pipes on cost and the risk of gas leakage	20
KT0504	Damage to micro-biodigester due to tree- roots, vibrations	20
KT0505	General characteristics of the best suitable site and typical soil conditions for micro-biodigester construction	20

Internal Assessment Criteria (IAC) and Weight

IAC CODE	IAC DESCRIPTION	% OF TIME TO BE SPENT
IAC0501	Explain and discuss why micro-biodigester should be constructed near cattle shed /kraal	20
IAC0502	Explain and discuss why micro-biodigester should be located in a sunny place	20
IAC0503	Explain and discuss why the distance between t h e micro-biodigester and the point of use should be as minimal as possible	20

IAC0504	Explain and discuss why micro-biodigester should not be constructed too close to the foundation of structures, growing trees, main trails and machines producing vibrations	10
IAC0505	Explain and discuss why micro-biodigesters should not be constructed in waterlogging areas and slide-prone areas	10
IAC0506	Explain and discuss the characteristics of the best site for constructing micro-biodigesters	10
IAC0507	Discuss soil conditions that are critical to determine the suitability of building a brick digester in a specific location.	10

KM-01-KT06 Principles for construction of a fixed dome micro-biodigester 10%		
TOPIC ELEMENT CODE	**TOPIC ELEMENT TITLE**	**% OF TIME TO BE SPENT**
KT0601	Sequential order of micro-biodigester construction (layout, excavation, digester, gas holder, maintenance hole, outlet, inlet, slurry pits)	50
KT0602	Methods to fix reference line	50

Internal Assessment Criteria (IAC) and Weight

IAC CODE	**IAC DESCRIPTION**	**% OF TIME TO BE SPENT**
IAC0601	Describe methods of construction of different components of a fixed dome micro-biodigester	40
IAC0602	Describe the relative positioning of different components of fixed dome micro-biodigester	40
IAC0603	Explain and discuss the importance of reference line	30

3.1.2 Criteria for accreditation

Requirements, against which Skills Development Providers (SDP) and Assessment Centres, will be accredited, as listed below.

Physical Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
EQUIPMENT & TOOLS	• Physical training facilities (or if using a hybrid or e-learning model – software or internet platform) conducive to hosting the number of learners comfortably and safely for the duration of this module. • Ablutions and hand washing facilities. • Curriculum aligned learning materials, workbooks. • Tools and standards for internal assessment • Record keeping systems to capture learner data and issue a statement of results. • Assessment instruments to cover the related topics. • Tools and standards for formative and summative assessments • Brochures of micro-biodigester technology
CONSUMABLES	All consumables such as paper, samples and materials required for provision of this module • Flip chart paper • Meta cards – different colours • Marker pens (Permanent and board marker) • Masking tape (rolls) • Cello tape • Micro-biodigester drawing • Pens • Pencils • Erasers • Writing pad/notebook • Glue stick • Plain paper (A4)

ASSESSMENT CENTRE
Not applicable

Human Resource Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
QUALIFICATIONS & EXPERIENCE	Facilitator must have a minimum NQF Level 4 Building Construction / Bricklayer Trade with at least two years of work experience with Biogas industry as a technical supervisor or trainer.
FACILITATOR/LEARNER RATIO	Facilitator/learner ratio 1: maximum 25

ASSESSMENT CENTRE

Not applicable

Legal Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
QUALIFICATIONS & EXPERIENCE	• CIPC registered entity • Valid SARS Tax compliance pin • Compliant and current health and safety audit report • Relevant labour legislation displayed in the building • POPI policy
FACILITATOR/LEARNER RATIO	N/A

3.1.3 Exemptions

None

4 Practical Skill Module (PM) Specifications:

NB: MODE OF DELIVERY e.g. face-to-face/contact, online, e-learning, mobile training unit, blended, distance, etc

MODULE CODE	MODULE TITLE	NQF LEVEL	CREDITS	MODE OF DELIVERY
900293-000-00-PM-01	Construct the civil structure of a fixed dome brick and mortar digester, pre-manufacturer ballon type digester and pre-manufactured rotor moulded plastic micro-biodigester	4	36	Face-to-face
900293-000-00-PM-02	Install pipeline, appliances and electro-mechanical components	4	8	Face-to-face
900293-000-00-PM-03	Operate and maintain fixed dome, ballon type or pre-manufactured plastic type micro-biodigesters	4	4	Face-to-face

4.1 Practical Module (PM) - 01: 900293-000-00-PM-01, Construct the civil structure of a fixed dome brick and mortar digester, pre-manufacturer ballon type digester and pre-manufactured rotor moulded plastic micro-biodigester, NQF Level 4, Credits 36

Practical Module (PM) - 01

MODULE CODE	MODULE TITLE	NQF LEVEL	CREDITS	MODE OF DELIVERY
900293-000-00-PM-01	Construct the civil structure of a fixed dome brick and mortar digester, pre-manufacturer ballon type digester and pre-manufactured rotor moulded plastic micro-biodigester	4	36	Face-to-face

4.1.1. Module Details

(a) Purpose of the Practical Skills Module:

The focus of the learning in this module is on providing the learner an opportunity to construct the civil structure of a fixed dome brick and mortar digester, pre-manufacturer ballon type digester and pre-manufactured rotor moulded plastic micro-biodigester within a simulated or working environment under the supervision of a qualified person.

The learner will be required to perform the activities listed below:

(b) List of Practical Skill Activities:

PRACTICAL SKILL CODE	ACTIVITY TITLE
PM-01-PS01	Select a suitable type and size of micro-biodigester
PM-01-PS02	Carry out basic calculations
PM-01-PS03	Interpret the relation between Hydraulic Retention Time (HRT), quantity of feeding materials and required size of micro-biodigester
PM-01-PS04	Construct digester
PM-01-PS05	Construct gas holder and turret
PM-01-PS06	Construct manhole, outlet/hydraulic chamber
PM-01-PS07	Construct inlet and mixing tank
PM-01-PS08	Construct slurry collection and composting pit
PM-01-PS09	Implement occupational health and safety and quality assurance activities

(c) Scope of each Practical Skill Activity:

PM-01-PS01 Select a suitable type and size of micro-biodigester	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0101	Identify the criteria for site selection, proximity to cattle shed and point of application
PA0102	Identify the place
PA0103	Check soil conditions
PA0104	Identify criteria for micro-biodigester size selection – availability and accessibility of feeding materials (cattle dung), gas/demand requirements, gas use patterns, types of end-use applications

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	**APPLIED KNOWLEDGE**
AK0101	Micro-biodigester types and sixes
AK0102	Site selection procedures
AK0103	Characteristics of safer construction
AK0104	Procedures for checking soil
AK0105	Feeding materials
AK0106	Estimation procedures

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	**IAC DESCRIPTION**
IAC0101	The pre-requisite for the selection of micro-biodigester type are identified such as consideration of durability, reliability, affordability, and friendliness for construction and operation
IAC0102	The suitability of different designs is identified in terms of the specific site conditions

IAC0103	The pre-requisites are identified for the selection of micro-biodigester size
IAC0104	The quantity of feeding materials (cattle dung) is estimated in terms of availability and gas production
IAC0105	The quantity of gas is estimated in terms of requirements based on end-use applications
IAC0106	A suitable size of micro-biodigester is selected based on primary election criteria

PM-01-PS02 Carry out basic calculations	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0201	Perform addition, subtraction and multiplication of measurement units
PA0202	Calculate the cost and quantity estimation of micro-biodigesters
PA0203	Identify quantity requirements of various construction materials

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0201	Methods of addition, subtraction, multiplication and division
AK0202	Cost of construction materials and appliances
AK0203	Quantity of construction materials

Internal Assessment Criteria (IAC)

IAC CODE	IAC DESCRIPTION
IAC0201	Basic addition, subtraction and multiplication of measurement units are performed in the construction of different structural components of fixed dome micro-biodigesters

IAC0202	Costs are calculated and quantities of micro-biodigesters are estimated in preparation for construction
IAC0203	Construction materials required for different sizes of micro-biodigesters are identified and quantified.

PM-01-PS03 Interpret the relation between HRT, quantity of feeding materials and required size of micro-biodigester	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0301	Identify effect of HRT
PA0302	Identify relation between feeding and HRT
PA0303	Select size of micro-biodigester

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0301	Concept of HRT
AK0302	Concept of dead volumes
AK0303	Effect of increase or decrease in size on HRT

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	IAC DESCRIPTION
IAC0301	The effect of HRT is identified in terms of the site selection
IAC0302	The relation between the quantity of feeding and HRT is identified
IAC0303	The size of micro-biodigester is selected based on feeding materials and estimated HRT

PM-01-PS04 Construct digester
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:

Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0401	Assess soil conditions
PA0402	Layout (demarcation) micro-biodigester
PA0403	Excavate the pit
PA0404	Prepare mortar
PA0405	Prepare the base of the digester and construct the foundation
PA0406	Construct digester walls and dome
PA0407	Fix inlet pipes
PA0408	Plaster digester walls and dome
PA0409	Maintain plumb of digester walls and dome

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	**APPLIED KNOWLEDGE**
AK0401	Methods for layout
AK0402	Quality standards for the construction of digester components

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	**IAC DESCRIPTION**
IAC0401	typical soil conditions are examined to determine how it will affect the building of a digester
IAC0402	The micro-biodigester is constructed meeting all construction quality standards including correct radius, correct height, foundation, floor, walls, inlet pipes, plastering, verticality of wall, smoothness of walls

PM-01-PS05 Construct gas holder and turret
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:

Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0501	Prepare scaffolding and formworks for dome casting
PA0502	Select and use the proper size of templates
PA0503	Prepare mortar and cast gas holder
PA0504	Remove scaffolding and frameworks
PA0505	Carry out inside plastering of the gas holder

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	**APPLIED KNOWLEDGE**
AK0501	Preparation procedures
AK0502	Quality standards for construction of gas holder

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	**IAC DESCRIPTION**
IAC0501	The construction of gas holder and turret is performed meeting all construction quality standards including correct frameworks, correct plastering layers for gas tightness, correct height, smoothness of the surface, correct placing of gas outlet pipe

PM-01-PS06 Construct manhole, outlet/hydraulic chamber	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0601	Maintain the correct size of the maintenance hole

PA0602	Construct outlet walls
PA0603	Plaster outlet walls
PA0604	Maintain plumb of outlet wall
PA0605	Cast concrete cover slab for outlet and fit in place

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0601	Construction procedures
AK0602	Quality standards for construction of manhole and outlet tank of a micro-biodigester

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	IAC DESCRIPTION
IAC0601	The construction of manhole and outlet tank of a micro-biodigester is performed meeting all construction quality standards including correct size, proper finishing and plumb, the correct placing of over-flow opening, correct earth-filling against the walls

PM-01-PS07 Construct inlet and mixing tank	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0701	Construct a platform for the inlet tank
PA0702	Construct walls of the inlet tank
PA0703	Plaster inlet tank
PA0704	Fix mixing device

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0701	Construction procedures
AK0702	Quality standards for construction of inlet and mixing tank

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	IAC DESCRIPTION
IAC0701	A platform is constructed for the inlet tank meeting all construction procedures
IAC0702	Walls for the inlet tank are constructed meeting quality standards including dimensions and alignment, material quality, wall strength and curing
IAC0703	Inlet tank is plastered meeting the required quality and construction standard including surface preparation, plaster quality, plaster thickness, finish and smoothness and curing of plaster
IAC0704	Mixing device is fixed in accordance with standards including correct placement, installation quality, functionality, alignment and clearance and durability

PM-01-PS08 Construct slurry collection and composting pit	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0801	Select the location of the slurry collection and composing pit
PA0802	Select the size of the collection and composting pits
PA0803	Excavate pits
PA0804	Construct walls and roof of the pits

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0801	Construction procedures
AK0802	Quality standards for construction of slurry collection and composting pit

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	IAC DESCRIPTION
IAC0801	The location is positioned at a safe distance from the biodigester, easily accessible, and in a low-lying area where slurry can flow naturally without excessive pumping or transportation and is far from water sources, residential areas, and public pathways to avoid contamination and odours
IAC0802	The pit size is sufficient to handle the expected volume of slurry generated from the biodigester over a set period, allowing for proper collection and composting without overflowing and allows for the installation of an adequate drainage system
IAC0803	The excavation follows the exact dimensions (length, width, and depth) needed for both slurry collection and composting purposes and the soil has been tested for stability
IAC0804	The walls are constructed to the correct height and thickness, ensuring proper plumb (vertical alignment) and reinforcement and includes the installation of proper drainage systems

PM-01-PS09 Implement occupational health and safety and quality assurance activities	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0901	Implement quality norms during construction
PA0902	Implement occupational health and safety measures

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0901	Quality assurance procedures and processes
AK0902	Procedures and processes for maintaining quality
AK0903	Implementing biogas roles and responsibilities
AK0904	Procedures, processes, methods and techniques of using personal safety gear
AK0905	Procedures, processes, methods and techniques of using construction tools and equipment
AK0906	Procedures, processes, methods and techniques of safety measures at works
AK0907	Procedures, processes, methods and techniques of confined space entry

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	IAC DESCRIPTION
IAC0901	Quality assurance practices are implemented in micro-biodigester construction and as part of the quality control framework including construction, the durability and serviceability of the micro-biodigester and responsibilities of a biogas technician (mason)
IAC0902	Occupational health and safety responsibilities are executed in the construction of the civil structure of a fixed dome micro-biodigester and the safe handling of construction tools and equipment

4.1.2. Criteria for accreditation

Requirements, against which Skills Development Providers (SDP) and Assessment Centres, will be accredited, as listed below.

Physical Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
EQUIPMENT & TOOLS	• Access to a real or simulated environment • Physical training facilities conducive to hosting the number of learners comfortably and safely for the duration of this module • Ablutions and hand washing facilities, shelter from the elements etc. • Learner Record keeping systems to capture learner data and issue a statement of results,

	• Quality Management System
	• Curriculum aligned practical guidebooks with clear instructions on activities (including templates and where relevant references to material or additional information required to cover aspects of the applied knowledge)
	• Tools and equipment in accordance with the type (fixed dome), design parameters, size (a minimum 6 cubic meter) etc.:
	  ○ Cement
	  ○ Bricks
	  ○ Sand
	  ○ Aggregates
	  ○ Piping.
	  ○ MS Rod
	  ○ Binding wire
	  ○ Gas storage drum
	  ○ Angle Iron for Guiding frames
	  ○ Scaffolding
	  ○ PVC/GI pipe and fittings as per site condition
	  ○ Biogas filters
	  ○ Biogas appliances
	  ○ Control valves – as per site condition
	  ○ Main gas pipe
	  ○ Teflon tape
	  ○ Pressure meter
	• Construction manuals
	• Operation manual
	• Micro-biodigester drawings
	• Models of micro-biodigesters
	• Measuring tape

CONSUMABLES	The provider must have, steel tape, writing materials in order for learners to fulfil the requirements of this modules as stated in the given statements • Flip chart paper • Meta cards – different colours • Marker pens (Permanent and board marker) • Masking tape (rolls)

	• Cello tape • Lime or marking powder • Ball pen • Pencils • Erasers • Writing pad/notebook • Glue stick • Brochures of micro-biodigester technology • Plastic bag • Plain paper (A4) • Construction materials

ASSESSMENT CENTRE
Not applicable

Human Resource Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
QUALIFICATIONS & EXPERIENCE	Facilitator must have a minimum NQF Level 4 Building Construction / Bricklayer Trade with at least two years of work experience with Biogas Construction as a technical supervisor or trainer.
FACILITATOR/LEARNER RATIO	Facilitator/learner ratio 1: maximum 15

ASSESSMENT CENTRE
Not applicable

Legal Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
QUALIFICATIONS & EXPERIENCE	• CIPC registered entity • Valid SARS Tax compliance pin • Compliant and current health and safety audit report • Relevant labour legislation displayed on the walls • POPI policy
FACILITATOR/LEARNER RATIO	N/A

4.1.3 Exemptions

None

4.2 Practical Module (PM) - 02: 900293-000-00-PM-02, Install pipeline, appliances and electro-mechanical components, NQF Level 4, Credits 89

Practical Module (PM) - 02

MODULE CODE	MODULE TITLE	NQF LEVEL	CREDITS	MODE OF DELIVERY
900293-000-00-PM-02	Install pipeline, appliances and electro-mechanical components	4	8	Face-to-face

4.2.1. Module Details

(a) Purpose of the Practical Skills Module:

The focus of the learning in this module is on providing the learner an opportunity to install pipeline, appliances and electro-mechanical components.

The learner will be required to perform the activities listed below:

(b) List of Practical Skill Activities:

PRACTICAL SKILL CODE	ACTIVITY TITLE
PM-02-PS01	Install pipeline
PM-02-PS02	Install appliances/Equipment
PM-02-PS03	Install gas filters
PM-02-PS04	Install Ballon type-well
PM-02-PS05	Implement occupational health and safety and quality assurance activities

(c) Scope of each Practical Skill Activity:

PM-02-PS01 Install pipeline	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0101	Select the correct size of pipes and fitting

PA0102	Select the best alignment for pipe laying
PA0103	Install and join pipes using the correct fitting and sealing agent
PA0104	Protect pipeline against possible damage

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0101	Quality assurance procedures and processes
AK0102	Procedures and processes for maintaining quality
AK0103	Installation procedures, processes, techniques and methods

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	IAC DESCRIPTION
IAC0101	Pipes and fittings are selected to the required quality standards
IAC0102	Pipes and fittings are aligned and joined to minimise additional cost and leakages
IAC0103	Sealing agents are used and safety measures are implemented to protect pipe and fitting against damages

PM-02-PS02 Install appliances/Equipment	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0201	Select a method of biogas appliances/equipment repair or installation
PA0202	Instal/repair biogas appliances/equipment

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE

AK0201	Quality assurance procedures and processes
AK0202	Procedures and processes for maintaining quality
AK0203	Installation procedures, processes, techniques and methods

Internal Assessment Criteria (IAC)

IAC CODE	IAC DESCRIPTION
IAC0201	Biogas appliances/equipment are identified in terms of end user application including biogas stoves, lamps, cookers, water heaters
IAC0202	Method is selected and used for repair of biogas appliances/equipment, in a low-pressure environment and in accordance with safety requirements
IAC0203	Sealing agents are used and safety measures are implemented to install appliances/equipment including gas flow meter, pressure, meter and temperature gauge

PM-02-PS03 Install gas filters	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0301	Install H2S remover
PA0302	Install moisture removal
PA0303	Install gas flow meter

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0301	Quality standards of the filter system
AK0302	Quality assurance procedures and processes
AK0303	Procedures and processes for maintaining quality

AK0304	Installation procedures, processes, techniques and methods

Internal Assessment Criteria (IAC)

IAC CODE	IAC DESCRIPTION
IAC0301	The H2S remover is installed in the correct position within the biogas pipeline according to specified quality standards, ensuring proper alignment and secure connections to effectively filter out hydrogen sulphide
IAC0302	The moisture removal system is correctly installed following quality installation guidelines, ensuring it is positioned to effectively remove moisture from the biogas
IAC0303	The gas flow meter is installed in the correct location within the pipeline, according to manufacturer and quality standards, to accurately measure the flow of biogas

PM-02-PS04 Install Ballon type-well	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0401	Install pump/generators
PA0402	Calculate gas demand
PA0403	Identify modifications of conventional machines to operate with biogas
PA0404	Install pumping arrangements, generators, control systems and blowers/compressors

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0401	Quality assurance procedures and processes
AK0402	Procedures and processes for maintaining quality

AK0403	Installation procedures, processes, techniques and methods

Internal Assessment Criteria (IAC)

IAC CODE	IAC DESCRIPTION
IAC0401	Quality standards and methods are used to install pump/generators
IAC0402	Gas demand is calculated and a pump/generator size is selected for a particular engine
IAC0403	Pumping arrangements, generators, control systems and blowers/compressors are installed in accordance with safety requirements

PM-02-PS05 Implement occupational health and safety and quality assurance activities	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0501	Implement quality norms when installing pipes, biogas equipment and filters
PA0502	Implement occupational health and safety measures

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0501	Quality assurance procedures and processes
AK0502	Procedures and processes for maintaining quality
AK0503	Roles and responsibilities when installing pipes, appliances and filters
AK0504	Procedures, processes, methods and techniques of using personal safety gear
AK0505	Procedures, processes, methods and techniques of using construction tools and equipment

AK0506	Procedures, processes, methods and techniques of safety measures at works
AK0507	Procedures, processes, methods and techniques of confined space entry

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	IAC DESCRIPTION
IAC0501	Quality assurance practices are implemented when installing pipes, appliances and filters and as part of the quality control framework including effect of sub-standard quality of installation on the durability and serviceability of the micro-biodigester and responsibilities of a micro-biodigester constructor
IAC0502	Occupational health and safety responsibilities are executed in the installation of pipeline, appliances and electro-mechanical components and the safe handling of construction tools and equipment

4.2.2. Criteria for accreditation

Requirements, against which Skills Development Providers (SDP) and Assessment Centres, will be accredited, as listed below.

Physical Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
EQUIPMENT & TOOLS	• Access to a real or simulated environment • Physical training facilities conducive to hosting the number of learners comfortably and safely for the duration of this module • Facilities that meet the minimum requirements for the comfort of learners (ablutions, hand washing facilities, shelter from the elements etc.), if relevant • Record keeping systems to capture learner data and issue a statement of results, document control system and policies and procedures for operations • The provider must have practical guidebooks with clear instructions on activities (including templates and where relevant references to material or additional information required to cover aspects of the applied knowledge)

	• The provider must have the following tools and equipment in accordance with the type (fixed dome), design parameters, size (a minimum 6 cubic meter) etc.:
	  ○ Cement
	  ○ Bricks
	  ○ Sand
	  ○ Aggregates
	  ○ Piping.
	  ○ MS Rod
	  ○ Binding wire
	  ○ Gas storage drum
	  ○ Angle Iron for Guiding frames
	  ○ Scaffolding
	  ○ PVC/GI pipe and fittings as per site condition
	  ○ Biogas filters
	  ○ Biogas appliances
	  ○ Control valves – as per site condition
	  ○ Main gas pipe
	  ○ Teflon tape
	  ○ Pressure meter
	• Micro-biodigester drawing
	• Operation manual
	• Brochures of micro-biodigester technology
	• Models of micro-biodigesters

CONSUMABLES	The provider must have materials, tools and equipment, steel tape, writing materials in order for learners to fulfil the requirements of this modules as stated in the given statements • Flip chart paper • Meta cards – different colours • Marker pens (Permanent and board marker) • Masking tape (rolls) • Sellotape • Lime or marking powder • Construction manuals • Ball pen • Pencils

	• Erasers • Writing pad/notebook • Glue stick • Plastic bag • Plain paper (A4) • Measuring tape • Construction materials

Human Resource Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
QUALIFICATIONS & EXPERIENCE	Facilitator must have a minimum NQF Level 4 Building Construction / Bricklayer Trade with at least two years of work experience with Biogas Construction as a technical supervisor or trainer.
FACILITATOR/LEARNER RATIO	Facilitator/learner ratio 1: maximum 15

ASSESSMENT CENTRE
Not applicable

Legal Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
QUALIFICATIONS & EXPERIENCE	• CIPC registered entity • SARS Tax compliance pin • Compliant and current health and safety audit report • Relevant labour legislation • POPI policy
FACILITATOR/LEARNER RATIO	N/A

ASSESSMENT CENTRE
Not applicable

Additional Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)
None

ASSESSMENT CENTRE
None

4.2.3 Exemptions

None

4.3 Practical Module (PM) - 03: 900293-000-00-PM-03, Operate and maintain fixed dome micro-biodigesters, ballon type and floating inverted pre-manufactured plastic type, NQF Level 4, Credits 4

Practical Module (PM) - 03

MODULE CODE	MODULE TITLE	NQF LEVEL	CREDITS	MODE OF DELIVERY
900293-000-00-PM-03	Operate and maintain fixed dome micro-biodigesters, ballon type and floating inverted pre-manufactured plastic type	4	4	Face-to-face

4.3.1. Module Details

(a) Purpose of the Practical Skills Module:

The focus of the learning in this module is on providing the learner an opportunity to Operate and maintain fixed dome micro-biodigesters, ballon type and floating inverted pre-manufactured plastic type.

The learner will be required to perform the activities listed below:

(b) List of Practical Skill Activities:

PRACTICAL SKILL CODE	ACTIVITY TITLE
PM-03-PS01	Conduct operational checks
PM-03-PS02	Conduct minor repair and maintenance works
PM-03-PS03	Identify potential problems and likely solutions
PM-03-PS04	Optimise use of bio slurry
PM-03-PS05	Operate and maintain micro-biodigester
PM-03-PS06	Implement warranty and occupational health and safety

(c) Scope of each Practical Skill Activity:

PM-03-PS01 Conduct operational checks
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:

PRACTICAL SKILL ACTIVITY ELEMENT CODES	PRACTICAL SKILL ACTIVITY ELEMENTS
PA0101	Prescribe the correct quantity of feeding
PA0102	use of different appliances such as water drain, main valve, gas taps
PA0103	Perform leakage testing

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0101	Operational activities such as feeding of micro-biodigester, checking of gas leakages, regeneration of filter media
AK0102	Potential problems and likely solutions
AK0103	Operation and maintenance procedures and processes

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	IAC DESCRIPTION
IAC0101	The correct quantity of feeding is prescribed to prevent the effect of under-feeding and over-feeding
IAC0102	Different appliances are use such as water drain, main valve, gas taps
IAC0103	Leakage testing is performed in accordance with operational procedures and requirements for the effective functioning of micro-biodigesters

PM-03-PS02 Conduct minor repair and maintenance works	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0201	Change washers

PA0202	Perform greasing/oiling of gas taps
PA0203	Perform minor repairs to appliances
PA0204	Perform repair of leaked pipeline

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0201	Minor maintenance procedures, processes and methods

Internal Assessment Criteria (IAC)

IAC CODE	IAC DESCRIPTION
IAC0201	Minor maintenance activities are performed including changing washers of valves and taps and maintaining leaking joints

PM-03-PS03 Identify potential problems and likely solutions	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0301	Use of a pH meter, pressure meter, foot pump, and gas flow meter
PA0302	Carry out pressure testing
PA0303	Perform inspections

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0301	Procedures, processes and methods of detecting potential problems and likely solutions

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	IAC DESCRIPTION
IAC0301	A pH meter, pressure meter, foot pump, and gas flow meter are used to identify potential problems
IAC0302	Pressure testing is carried out to detect biogas leakages
IAC0303	The colour of bio-slurry, water dung ratio, flow pattern and odour of bio-slurry are inspected to assess potential problems

PM-03-PS04 Optimise use of bio-slurry	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0401	Identify potentials for diversification of biogas end-use applications
PA0402	Optimise utilisation of bio slurry

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0401	Effect of under utilisation of biogas
AK0402	Characteristics and benefits of bio slurry
AK0403	Benefits of composting bio slurry
AK0404	Procedures, processes and methods of optimising the use of biogas
AK0405	Procedures, processes and methods of handling of bio slurry

Internal Assessment Criteria (IAC)

IAC CODE	IAC DESCRIPTION
IAC0401	Potentials for diversification of biogas end-use applications are identified in accordance with appliance
IAC0402	Suitable methods are applied for optimal utilisation of bio slurry

PM-03-PS05 Operate and maintain micro-biodigester	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**
PA0501	Identify potential problems and likely solutions
PA0502	Teach users to carry out adequate operation works
PA0503	Teach users to carry out minor repair and maintenance works

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	**APPLIED KNOWLEDGE**
AK0501	User orientation procedures
AK0502	Problem identification and solutions
AK0503	Effective operation and maintenance procedures and processes

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	**IAC DESCRIPTION**
IAC0501	Users are capacitated and orientated on how to operate and maintain the micro-biodigester

PM-02-PS06 Implement warranty and occupational health and safety	
PRACTICAL SKILL ACTIVITY SCOPE OUTLINE:	
Given ash or marking powder, micro-biodigester drawing, construction manuals, operation manual, brochures of micro-biodigester technology, working model of a micro-biodigester, measuring tape, sketches/plans, drawings, construction tools and equipment, construction materials, the learner must be able to:	
PRACTICAL SKILL ACTIVITY ELEMENT CODES	**PRACTICAL SKILL ACTIVITY ELEMENTS**

PA0601	Implement warranty requirements
PA0602	Implement occupational health and safety measures

Applied Knowledge that underpins the Practical Skill Activity

APPLIED KNOWLDEGE CODE	APPLIED KNOWLEDGE
AK0601	Warranty provisions
AK0602	Roles and responsibilities biogas technician during operation and maintenance
AK0603	Procedures, processes, methods and techniques of using personal safety gear
AK0604	Procedures, processes, methods and techniques of using maintenance tools and equipment
AK0605	Procedures, processes, methods and techniques of safety measures at works

Internal Assessment Criteria (IAC) for the Practical Skill Activity

IAC CODE	IAC DESCRIPTION
IAC0601	Personal safety is implemented by using helmet, safety shoes, safety belt
IAC0602	Occupational health and safety responsibilities are executed in operation and maintenance activities

4.3.2. Criteria for accreditation

Requirements, against which Skills Development Providers (SDP) and Assessment Centres, will be accredited, as listed below.

Physical Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
EQUIPMENT & TOOLS	• Access to a real or simulated environment • Physical training facilities conducive to hosting the number of learners comfortably and safely for the duration of this module

	• Facilities that meet the minimum requirements for the comfort of learners (ablutions, hand washing facilities, shelter from the elements etc.), if relevant
	• Record keeping systems to capture learner data and issue a statement of results, document control system and policies and procedures for operations
	• The provider must have practical guidebooks with clear instructions on activities (including templates and where relevant references to material or additional information required to cover aspects of the applied knowledge)
	• The provider must have the following tools and equipment in accordance with the type (fixed dome), design parameters, size (a minimum 6 cubic meter) etc.:
	  ○ Cement
	  ○ Bricks
	  ○ Sand
	  ○ Aggregates
	  ○ Piping.
	  ○ MS Rod
	  ○ Binding wire
	  ○ Gas storage drum
	  ○ Angle Iron for Guiding frames
	  ○ Scaffolding
	  ○ PVC/GI pipe and fittings as per site condition
	  ○ Biogas filters
	  ○ Biogas appliances
	  ○ Control valves – as per site condition
	  ○ Main gas pipe
	  ○ Teflon tape
	  ○ Pressure meter
	• Micro-biodigester drawing
	• Construction manuals
	• Brochures of micro-biodigester technology
	• Models of micro-biodigesters

CONSUMABLES	The provider must have materials, tools and equipment, steel tape, writing materials for learners to fulfil the requirements of this modules as stated in the given statements • Flip chart paper • Meta cards – different colours • Marker pens (Permanent and board marker) • Masking tape (rolls) • Cello tape • Lime or marking powder • Operation manual • Ball pen • Pencils • Erasers • Writing pad/notebook • Glue stick • Plastic bag • Plain paper (A4) • Measuring tape • Construction materials

ASSESSMENT CENTRE
Not applicable

Human Resource Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
QUALIFICATIONS & EXPERIENCE	Facilitator must have a minimum NQF Level 4 Building Construction / Bricklayer Trade with at least two years of work experience with Biogas Construction as a technical supervisor or trainer.
FACILITATOR/LEARNER RATIO	Facilitator/learner ratio 1: maximum 15

ASSESSMENT CENTRE
Not applicable

Legal Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)	
QUALIFICATIONS & EXPERIENCE	• CIPC registered entity • SARS Tax compliance pin • Compliant and current health and safety audit report • Relevant labour legislation • POPI policy
FACILITATOR/LEARNER RATIO	N/A

ASSESSMENT CENTRE
Not applicable

Additional Requirements:

SKILLS DEVELOPMENT PROVIDER (SDP)
None

ASSESSMENT CENTRE
None

4.3.3 Exemptions

None

6 POSSIBLE SEQUENCING AND INTEGRATION

Listing and order of modules in the sequence in which these modules will follow each other during delivery/implementation. This allows for integration of KM, AM (PM/ WM) as work logically flows.

ORDER	MODULE TITLE	MODULE CODE	LEVEL	CREDITS
1.	Basics of Biogas Generation and Installation of a Micro-biodigester	900293-000-00-KM-01	4	2
2.	Construct the Civil Structure of a fixed dome micro-biodigester,	900293-000-00-PM-01	4	36

	ballon type and floating inverted pre-manufactured plastic type			
3.	Install pipeline, appliances and electro-mechanical components	900293-000-00-PM-02	4	8
4.	Operate and maintain fixed dome micro-biodigesters, ballon type and floating inverted pre-manufactured plastic type	900293-000-00-PM-03	4	4