Quality Council for Trades & Occupations
www.qcto.org.za
256 Glyn Street, Hatfield, Pretoria, 0083
Private Bag X278, Pretoria, 0001
+27 12 003 1800

QCTO OCCUPATIONAL SKILLS PROGRAMME DOCUMENT

IN LINE WITH 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

START DATE	END DATE	LAST DATE FOR ENROLMENT	LAST DATE FOR ACHIEVEMENT
30 January 2025	30 January 2030	30 January 2031	30 January 2024

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	EW SETA

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1. QUALIFICATION/PART-QUALIFICATION/SKILLS PROGRAMME DETAILS

1.1 Sub-Framework: Occupational Qualifications Sub-Framework

Occupational Qualifications Sub-Framework

1.2 Type (Nomenclature):

1.2.1 Specify if this is a Qualification/Part-Qualification/Skills Programme

NB: Credit value of more than 120 and above is a Qualification.
Credit value of less than 120 credits is a Part-Qualification
Skills Programme 8 – 60 credits

Skills Programme

1.2.2 Type: (Nomenclature) e.g. Advanced Occupational Certificate)

NB: For Part-Qualification use Occupational Certificate as Qualification Nomenclature
Skills Programmes use Skills Programme, as nomenclature.

Skills Programme

1.3 Title Descriptor:

State the Occupation, Specialisation, context or Skills Programme context

Micro-Biogas Digester Constructor

1.4 NQF Level:

4

1.5 Credits:

50

1.6. Organising Field and Sub-field:

NB: Not Applicable to Skills Programmes

1.6.1 Organising Field:

Field 06: Manufacturing, Engineering and Technology

1.6.2 Organising Sub-Field:

Engineering and Related Design

1.7 QCTO Curriculum Code:

900293-000-00-00

1.8 Originator/Quality Partner (QP) – Development/Assessment

N/A

1.8.1 Quality Partner (Qualifications Development):

Energy and Water SETA
22 Wellington Road
Parktown, Johannesburg
South Africa

1.8.2 Quality Partner (Assessment):

NB: Not Applicable to Skills Programmes

N/A

1.9 Replacement

For the Replacement of Registered Occupational/Historical Qualifications/Unit Standards (US) and/or Learning Programmes (LP)/ QCTO/SETA Approved Skills Programmes, list details below:

This qualification replaces:

SAQA QUAL/US/LP ID OR QCTO/SETA APPROVAL ID	QUALIFICATION TITLE	Pre-2009 NQF Level	CURRICULUM CODE *(if Occupational)*	NQF LEVEL	MIN. CREDITS
N/A					

If there are no qualifications or learning programmes that must be replaced, then state that this qualification does not replace any other qualification, and no other qualification replaces it.

2. RATIONALE

2.1 The need for the Qualification, Part-Qualifications/Skills Programmes

The need for this skills programme stems from the country's increasing focus on sustainable energy solutions and waste management. As South Africa continues to battle energy shortages and seeks sustainable alternatives to fossil fuels, biogas emerges as a viable, renewable source that can significantly contribute to energy security and environmental sustainability. This skills programme is critical as it prepares a skilled workforce capable of advancing biogas technology, which utilises organic waste materials to generate clean energy. Such skills are essential not only for reducing greenhouse gas emissions but also for enhancing waste management practices across urban and rural areas, thus aligning with national priorities on climate change and sustainable development.

The learning pathway for the Micro-Biogas Digester Constructor programme is structured to provide a progressive build-up of skills, starting from basic principles of biogas production and safety measures to more complex operational and maintenance procedures. Initially, learners will gain a foundational understanding of anaerobic digestion and the types of biomasses

suitable for biogas production. The course will then advance to practical skills for construction of brick-and-mortar digester structure, handling equipment, troubleshooting common issues, and optimising the efficiency of biogas plants. After completing this NQF Level 4 programme, learners will have the opportunity to pursue higher levels of study, including specialised training in biogas technology or broader renewable energy systems, paving the way for career advancement in technical or managerial roles within the sector. This pathway is designed to not only fulfil immediate skills needs in the biogas sector but also to prepare learners for lifelong learning and adaptation in a rapidly evolving field.

2.2 Similar Qualification(s), Part-Qualifications/Skills Programmes

List similar Qualification(s), Part-Qualifications/Skills Programmes, already NQF registered/ QCTO approved:

Currently, there are no similar qualifications, part-qualifications or skills programmes specifically focused on micro-digester installations.

2.3 Benefit to the sector, society and the economy:

The introduction of the Micro-Biogas Digester Constructor skills programme will yield significant benefits for the biogas sector by creating a qualified workforce that can enhance the efficiency and sustainability of construction micro-digesters with a specific focus on the fixed dome, brick structure.

Society will benefit from improved environmental health associated with the burning of wood and other fossil fuels in dwellings, as well as better waste management and reduced reliance on non-renewable energy sources.

Economically, this programme supports the green economy, potentially leading to job creation in rural and underserved urban areas, thus fostering inclusive economic growth and reducing unemployment.

2.4 Typical learners:

The range of typical learners for the Micro-Biogas Digester Constructor skills programme would specifically targets those who are currently unemployed with bricklaying skills/qualifications who have not had the opportunity to pursue further education or development, and workers in the agricultural or waste management sectors seeking to upskill and transition into the renewable energy field. This also includes community members from rural areas where biogas could significantly impact energy access and sustainability.

2.5 Relation to Occupation(s) and/or Profession(s)

2.5.1 Occupation(s) related:

2.5.1.1 Collaboration with relevant stakeholders:

Various stakeholders within the biogas and renewable energies environment were involved during the development of this skills programme.

2.5.1.2 List typical occupations in which the qualifying learner will operate (if relevant)

Micro-Biogas Digester Constructor.

2.5.2 Profession(s) related:

2.5.2.1 Collaboration with relevant stakeholders:

N/A

2.5.2.2 List typical professions in which the qualifying learner will operate (if relevant)

N/A

3. PURPOSE

3.1 Benefit the learners:

Learners enrolling for this skills programme would acquire skills relevant to sizing, constructing and installing 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.

3.2 What the qualification or part-qualification intends to achieve:

i.e. what the qualifying learner will know, do and understand after achievement;

The purpose of this skills programme is to prepare a learner to operate as a Micro-Biogas Digester Constructor.

A qualified learner will be able to:

- Size, construct and install micro-biodigester and components.
- Operate, maintain and monitor micro-biodigester installations

3.3 Typical Graduate attributes

A qualified learner will be able to demonstrate the following key attributes: principles and procedurally oriented, problem solving, critical and creative thinking, and accuracy.

4. ENTRY REQUIREMENTS

NQF Level 3 qualification in Bricklaying.

5. RECOGNITION OF PRIOR LEARNING (RPL)

5.1 RPL for Access to Training/Exemption:

NB: QCTO Standard Statement

Learners may use the RPL process to gain access to training opportunities for a programme of learning, qualification, part-qualification or skills programme if they do not meet the formal, minimum entry requirements for admission. RPL assessment provides an alternative access route into a programme of learning, qualification, part-qualification, or skills programme.

Such an RPL assessment may be developed, moderated and conducted by the accredited Skills Development Provider which offers that specific qualification/part qualification/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.

For exemption from modules through RPL, learners who have gained the stipulated competencies of the modules of a programme of learning, qualification, part-qualification or 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.

5.2 RPL for Access to the External Integrated Summative Assessment (EISA) or Final Integrated Supervised Assessment (FISA):

NB: QCTO Standard Statement

Learners who have gained the stipulated competencies of the modules of a programme of learning, qualification, part-qualification or 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 qualification, part-qualification or skills programme. Quality Partners are responsible for ensuring the RPL mechanism and process for qualifications and part-qualification is approved by the QCTO.

6. RULES OF COMBINATION

6.1 Components:

KNOWLEDGE/THEORY COMPONENT

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

State compulsory modules:

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

Total Credits = 2

PRACTICAL SKILLS MODULE(S)

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

State compulsory modules:

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

Total Credits = 48

6.2 Soft Skills Included:

Indicate if 5% -10% of soft skills is included and give location notes on the modules where this is found:

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

7. EXIT LEVEL OUTCOMES (ELO) AND ASSOCIATED ASSESSMENT CRITERIA (AAC)

7.1 Exit Level Outcomes (ELO) 1:

Use a variety of common tools and instruments to construct and install micro-biodigesters and components safely within a supervised environment.

Associated Assessment Criteria (AAC) for ELO 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
- Micro-biodigester components are selected and sized for and during installation following the occupational health and safety protocols and procedures
- The basics of biogas generation are applied during the installation of micro-biodigesters

7.2 Exit Level Outcomes (ELO) 2:

Apply common methods and solutions to operate, maintain and monitor micro-biodigester, taking cognisance of consequences of related actions.

Associated Assessment Criteria (AAC) for ELO 2:

- Micro-biodigesters are operated and maintained for efficient functioning
- The operation of the micro-biodigester is monitored
- Health and safety are maintained during the operation and maintenance of the micro-biodigester

8. INTEGRATED ASSESSMENT

8.1 Formative Assessments conducted internally

NB: QCTO standard statements

Formative assessments are conducted throughout the training of learners. A range of formal, non-formal, and informal ongoing assessment activities are used to focus on teaching and learning outcomes to improve learner attainment.

Formative assessments are conducted continuously by the facilitator to feed into further learning, to identify strengths and weakness, and to ensure the learner's ability to apply knowledge, skills and workplace experience gained.

Formative Assessments are conducted by the accredited Skills Development Provider (SDP), and a variety of ongoing assessment methods may be used, for example, quizzes, assignments, tests, scenarios, role play, interviews. Continuous feedback must be provided.

8.2 Integrated Summative Assessments conducted Internally

NB: QCTO standard statements

Integrated Assessment involves all the different types of assessment tasks required for a particular qualification, part-qualification or occupational skills programme, such as written assessment of theory and practical demonstration of competence. To achieve this, the Internal Assessment Criteria (IAC) for all modules as found in the QCTO curriculum document must be followed.

An accredited SDP should implement a well-designed, formal, relevant, final internal Summative Assessment strategy for all modules to prepare learners for the FISA. These assessments evaluate learning achievements relating to the achievement of each module of the relevant components of the skills programme.

Internal Summative Assessments are developed, moderated and conducted by the SDP at the end of each module or after integration of relevant modules, e.g. applied knowledge tests, workplace tasks, practical demonstrations, simulated tasks/demonstrations, projects, case studies, etc.

NB: QCTO standard statements provided applicable for Qualifications and Part-qualifications only

The results of these final formal summative assessments must be recorded. These results, which include the Statement of Work Experience results, where applicable, contribute to the Statement of Results (SoR) that is a requirement for admission to the FISA. An SoR, using the template provided by the Quality Partner, is issued by the accredited SDP for qualifications and part-qualifications. The SDP must produce a valid Statement of Results for each learner, indicating the final result and the date on which the competence in each module, of each component, was achieved. Learners are required to produce this SoR, together with their ID document or alternative ID document, at the point of the FISA.

8.3 De-centralised Final Integrated Supervised Assessment (FISA) for Skills Programmes

NB: QCTO standard statements provided

The FISA is de-centralised and the assessment standards set by the QCTO must be implemented by the accredited SDP in the development, moderation and implementation of all FISA for Skills Programmes.

The accredited SDP manages and conducts the FISA and submits learner results for QCTO approval for certification, according to QCTO required compliance standards.

For entrance into the FISA, the learner must have completed the Skills Programme successfully and be found competent in all modules, recorded internally by the SDP.

Continuous Assessment

The SDP must ensure that all learners are enrolled with the QCTO at the start of training (within 5 days) in the format required by the QCTO.

Continuous assessment is set by the SDP in accordance with the outcomes provided.

This may consist of a variety of methods, e.g. practical or written assessments, assignments, projects, demonstrations, presentations or any other form of assessment to assist the learner in the learning process.

During training, it is mandatory for formal summative assessments to take place at the end of each module/topic. These results must be formally recorded and be available for monitoring and/or evaluation by the QCTO.

Final Integrated Supervised Assessment (FISA)

All learners gain entrance to the Final Integrated Supervised Assessment by successfully completing all formal summative assessments conducted by the SDP.

Format of FISA: A practical assessment/ practical and written assessment integrating the relevant Exit Level outcomes, with simultaneous verbal assessment of embedded knowledge by the assessor before, during or after the FISA.

All FISAs must be supervised, and virtual FISAs must be recorded throughout the assessment.

All Exit Level Outcomes must be covered in the FISA. In the FISA, the learner must demonstrate applied knowledge and skills to prove that the competencies of the Skills Programme have been achieved.

The FISA may not contain any assessments used in the "Continuous Assessment" process (thus no re-assessment).

Special considerations should be made for candidates with special learning needs.

Standards for Written Final Integrated Supervised Assessment (FISA):

The Written **FISA INSTRUMENT** must be developed and moderated by the SDP and conducted in a supervised environment. It is assessed by means of an INSTRUMENT and MEMORANDUM developed by the SDP for this purpose.

In the **Written Component**, learners must be given real-life scenarios in which they must demonstrate that they have applied knowledge/skills for all the Exit Level Outcomes in the following aspects of the curriculum:

1. **Safety Standards:**
   Apply knowledge of emergency procedures and the correct use of Personal Protective Equipment (PPE) for operators. Safe handling practices of equipment such as gas detectors, pressure release valves and machinery. Assess knowledge of safety protocols with evacuation plans and first aid protocols. Demonstrate a thorough understanding of Occupational Health and Safety Regulations.

2. **Biogas Fundamentals:**
   Understand, categorise and evaluate the anaerobic digestion process, including stages (hydrolysis, acidogenesis, acetogenesis, methanogenesis). Identify suitable feedstocks and their characteristics (e.g., high biogas yield, appropriate carbon-to-nitrogen ratios). Awareness of environmental benefits of biogas digesters, such as reducing greenhouse gas emissions and managing organic waste.

3. **Methods:**
   Select appropriate construction materials based on durability, cost, and local availability. Understand construction techniques to ensure the system is airtight and durable. Explain the role of components of the micro biogas digester system.
4. **Operation and Maintenance**
   Understand and apply proper feeding procedures, including maintaining a balanced mix of feedstock to optimize gas production. Diagnose and troubleshoot common operational issues Perform routine maintenance, including inspecting for leaks, cleaning components, and repairing worn-out parts.

To respond to challenges/issues/problems in the scenarios above:

a. The assessment should be a maximum of 3 hours.
b. The pass mark is 80% for the FISA.
c. No FISA instrument is allowed to be used verbatim for re-assessment or for a different cohort of learners.

Standards for Practical Final Integrated Supervised Assessment (FISA)

The Practical **FISA INSTRUMENT** (brief/job card/task) must be developed and moderated by the SDP and conducted in a supervised environment. It is assessed by means of a RUBRIC developed by the SDP for this purpose.

The learner should be provided with a brief/job card/task to demonstrate what the learner should show, know and apply, relevant to the Exit Level Outcomes and the purpose of the Skills Programme. This is the section where the learner must show applied competency (what the learner must be able to do, and to what expected standard).

A candidate must prove that he/she can work competently as a Micro-Biogas Digester Constructor in terms of each of the Exit Level Outcomes by demonstrating competencies in the following standards:

- Adherence to health and safety standards during the construction of a fixed dome brick-and-mortar digester using appropriate construction tools and equipment.
- Installation of pipelines, micro-biodigester appliances, and electro-mechanical components in compliance with occupational health and safety protocols and procedures.
- Selection and sizing of micro-biodigester components during installation, adhering to occupational health and safety guidelines.
- Application of the fundamentals of biogas generation during the installation of micro-biodigesters.
- Operation and maintenance of micro-biodigesters to ensure efficient functionality.
- Monitoring of the micro-biodigester's operation to maintain optimal performance.
- Adherence to health and safety standards during the operation and maintenance of the micro-biodigester.

Please take note of the following:

a) Candidates must be provided with clear guidelines and instructions on how to complete the assessment tasks/job, including the assessment criteria and expected outcomes.
b) The duration of the assessment is 5 hours.
c) No FISA instrument is allowed to be used verbatim for re-assessment or for a different cohort of learners.

NOTE: Should a learner be found to be competent in all of the above areas, they should be declared “Competent”. If not yet competent in any of the above areas, they should be declared “NYC”, re-trained and then be reassessed with different applicable tasks/scenarios.

Whilst conducting the above, strategic, well-timed questions should be asked of the learner to assess embedded knowledge gained during the skills programme, as well as critical thinking and problem-solving skills: for e.g.

- "Why.....?”
- "What would happen if …?”

- "When …. is done, what would the result be?"
- "How would you deal with ……?"

The marking rubric/compliance checklist used to assess these competencies must include a section for the assessor used in this session to make a note of competencies shown, (or not shown), as well as the questions that were asked, and a summary of the learner's answers, and state whether these are of the acceptable standard or not.

The marking rubric/compliance checklist compiled should contain specific areas marked with an asterisk (*) as compulsory sections for the learner to be declared C (Competent). Compulsory sections include but are not limited to when the candidate's or others' safety would be affected if incorrectly completed. [e.g., what to do in an emergency].

Learners who complete this skills programme will accumulate credits towards the relevant full or part qualification. The Credit Accumulation and Transfer (CAT) Policy may apply to these learners.

Submission of final results

Final results must be submitted to the QCTO in the required format, within 21 days of the date of the FISA, together with the following:

- Completed QA Verification Report on the FISA (QCTO template: various sections).
- Learner results spreadsheet
- A copy of the final Assessment Instrument used, as well as the marking guideline/rubric

9. ARTICULATION FOR SKILLS PROGRAMME

(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

10. NOTES

10.1 Additional Legal or Physical Entry Requirements

None

10.2 Criteria for Accreditation

Accreditation requirements, against which Skills Development Providers (SDP) and Assessment Centres, will be accredited, is found in the Curriculum Document, as listed below.

Curriculum Code:

900293-000-00-00

10.3 Encompassed Trades (where applicable)

This is not a trade qualification.

11. ASSOCIATED QUALIFICATION(S)/PART-QUALIFICATION(S):

SAQA QUAL ID	QUALIFICATION TYPE	QUALIFICATION DESCRIPTOR	NQF LEVEL	CREDITS
…	N/A			