



NATIONAL OCCUPATIONAL STANDARD FOR BIO-DIGESTER PLANT CONSTRUCTOR

APPROVING AUTHORITY

This National Occupational Standard has been prepared and published under the authority of the Zambia Qualifications Authority Board on 21st September 2021.

ZAMBIA QUALIFICATIONS AUTHORITY

The Zambia Qualifications Authority Act No. 13 of 2011 was enacted by the Government of the Republic of Zambia to ***“provide for the development and implementation of a national qualifications framework; establish the Zambia Qualifications Authority; provide measures to ensure that standards and registered qualifications are internationally comparable; and provide for matters connected with, or incidental to the foregoing”***. Among other functions, ZAQA is responsible for ***determining national standards for any occupation***, through various sector specific National Occupational Standards Development Teams (NOSDTs).

REVISION OF NATIONAL OCCUPATIONAL STANDARDS

National Occupational Standards shall be revised every after **5 years**, or whenever necessary, by the issue of either amendments or of revised editions. It is important that users of National Occupational Standards (NOS) should ascertain that they are in possession of the latest amendments or editions.

NOS DEVELOPMENT TEAM RESPONSIBLE

This National Occupational Standard was prepared by the Energy National Occupational Standards Development Team, upon which the following organisations were represented:

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2. Department of Energy - Ministry of Energy
3. Energy Regulation Board
4. Kafue Gorge Regional Training Centre
5. Mines Safety Department - Ministry of Mines and Minerals Development
6. Ministry of Labour and Social Security Services
7. Muhanya Solar
8. Northern Technical College
9. Rural Electrification Authority
10. SNV Zambia
11. University of Zambia
12. Zambia Qualifications Authority

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FOREWORD

The Zambia Qualifications Authority (ZAQA) is a statutory body under the Ministry of Higher Education established by ZAQA Act No. 13 of 2011 to “**provide for the development and implementation of a national qualifications framework; provide measures to ensure that standards and registered qualifications are internationally comparable; and provide for matters connected with, or incidental to the foregoing**”.

Among other functions, ZAQA is responsible for “**determining national standards for any occupation**”, through various sector specific National Occupational Standards Development Teams (NOSDTs) of experts composed of representation from appropriate authorities, government departments, industry, academia, regulators, consumer associations and non-governmental organizations, etc.

This National Occupational Standard (NOS) has been developed by the Energy National Occupational Standards Development Team in accordance with the procedures and guidelines of ZAQA. All users should ensure that they have the latest edition of this publication as National Occupational Standards are revised from time to time.

This NOS shall be used by, among others, industry, employers, quality assurance bodies, awarding and professional bodies and education and training institutions, as a benchmark to identify training needs, develop job profiles/descriptions, develop curricula and learning programmes, in various sectors where the occupation exists. In the Energy sector, demonstration of competence against this NOS may be required in order to run a business or practice a craft or profession.

JUSTIFICATION

The renewable energy sector is one of the growing sectors in Zambia and several steps are being taken to increase its uptake. On 30th December 2020, the Zambian Government submitted its updated Nationally Determined Contribution (NDC) to the United Nations Framework Convention for Climate Change (UNFCCC) highlighting renewable energy and energy efficiency as one of the three programmes through which the country is reducing its Greenhouse gas emissions. One of the major causes of climate change is the cutting down of trees to be used as wood fuel for heating and charcoal production. In order to manage this, the Government is trying to promote alternative cooking solutions which will assist in the reduction of the use of wood fuel and charcoal. Biogas is one of the alternatives to wood fuel and charcoal use for cooking.

Biogas is an eco-friendly fuel and can be used as a substitute for Liquefied Petroleum Gas and can be produced by use of a bio-digester. A Bio-digester Plant Constructors are responsible for constructing bio-digesters that breakdown and transform biodegradable materials, referred to as feedstock, such as cattle manure into inflammable gas (Biogas) and bio-slurry. The process to design, develop and fabricate a bio-digester requires specialised skills for it to function properly. In addition to biogas, bio-slurry as organic fertiliser is another very valuable product of the biodigester. A

biogas is therefore relevant to both the (renewable) energy and the (organic) agriculture sector

With the foregoing in mind, it is therefore necessary that Bio-digester Plant Constructors are equipped with the knowledge and skills required to construct a bio digester.

These National Occupational Standard highlights core knowledge, skills, competences and personal attributes that Bio-digester Plant Constructors must possess to be successful in their jobs.

ACRONYMS AND ABBREVIATIONS

BPC	Bio-digester Plant Constructor
CS	Core Skill
NOS	National Occupational Standard
NOSDT	National Occupational Standards Development Team
OK	Organisational Knowledge
PC	Performance Criteria
PS	Professional Skill
RK	Regulatory Knowledge
RPL	Recognition of Prior Learning
TK	Technical Knowledge
UNFCCC	United Nations Framework Convention for Climate Change
ZAQA	Zambia Qualifications Authority
ZQF	Zambia Qualifications Framework

GLOSSARY OF TERMS

For the purposes of this NOS, the following terms and definitions shall apply:

Core Skills/Generic Skills: are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the NOS, these include communication related skills that are applicable to most job roles.

Function: is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of NOS.

Job Title: defines a unique set of functions that together form a unique employment opportunity in an organisation.

Knowledge and Understanding: are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.

National Occupational Standards (NOS): are statements of the standards of performance individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding. They are precise descriptions of what an individual is expected to be able to do in his/her work role.

National Occupational Standards (NOS) Code: is a unique reference code that identifies a NOS.

National Occupational Standards Development Team (NOSDT): means an established group of national stakeholders/experts responsible for the development of National Occupational Standards within a specific economic sector or occupation.

Occupation: is a set of job roles, which perform similar/related set of functions in an industry.

Organisational Context: includes the way the organisation is structured and how it operates, including the extent of operative knowledge that managers have in their relevant areas of responsibility.

Performance Criteria: are statements that together specify the standard of performance required when carrying out a task.

Scope: is the set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on the quality of performance required.

Sector: is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.

Sub Sector: is derived from a further breakdown based on the characteristics and interests of its components.

Technical Knowledge: is the specific knowledge needed to accomplish specific designated responsibilities.

Unit Title: gives a clear overall statement about what the incumbent should be able to do.

1. OVERVIEW

This is an introductory section providing a brief summary and specific information or commentary about the content of the NOS and bioenergy sub sector and occupation to guide the professionals in the sector.

NOS Code	NOS.DBDC.01
Occupation	Bio-digester Plant Construction and Maintenance
Job Title	Bio-digester Plant Constructor
Job Description	<p>The BDC will be responsible for;</p> <ul style="list-style-type: none"> • Following strictly the design and drawing as provided to them during construction of bio-digesters. • Ensuring that the quality standards of construction materials and appliances are properly complied with. • Selecting proper size of bio-digester based upon the availability of feedstock and customer needs. • Providing necessary information on benefits of bio-digester to the users. • Providing the users with minimum requirement of knowledge and skill to operate various components of bio-digester.
Job Purpose	The job Holder constructs, installs and manages a bio-digester plant effectively and efficiently.
ZQF Level	Level 3
Sector	Energy
Sub sector	Renewable Energy
Other Economic Sector(s) in which the Occupation is Practiced	Academia, R&D, regulatory and standards agencies Diversified Farm Revenue, Rural Economic Growth Conservation of Agricultural Land, Energy Independence, Sustainable Food Production and Farm-Community Relationships
Other Similar Jobs that can be performed by the Bio-digester Plant Constructor	Bricklaying, plumbing, etc
Minimum Educational Job Entry Qualification(s)	Certificate
Practicing License Requirements (if any)	Membership with the Engineering Institute of Zambia and practicing license from Engineering Regulation Board (ERB)
Training/RPL	<ul style="list-style-type: none"> - Should be able to construct/install different types of bio-digesters - Should understand the basic operation and be able to carry out Maintenance activities related to bio-digesters - Understand the bio-digester technology
Minimum Job Entry Age	Anyone qualified to be employed under the laws of the country (18 years)
Prior Experience	Non
Performance Criteria	As described in the Units under Section 4

2. SCOPE

This National Occupational Standard specifies the fundamental knowledge and understanding, skills and competences that a Bio-digester Plant Constructor must possess to be successful in his/her job role. It is applicable to bio-digester Plant constructors working in public or private organisations or self-employed within or outside the Energy sector.

3. PERSONAL ATTRIBUTES (VALUES, ETHICS AND ATTITUDES)

This job requires an individual to possess:

- Reading and Writing skills,
- Oral Communication
- Ability to plan and prioritise
- Ability to work in a team
- Ability to handle various construction tools
- Creativity
- Problem solving skills
- Mathematics skills
- Integrity
- Interpersonal skills
- Commercial Awareness
- Attention to details
- Ability to read and understand plant drawings

4. UNITS AND ELEMENTS

This National Occupational Standard is divided into four (04) Units representing the tasks that a job holder should undertake in his/her day to day work. Each unit is further broken down into elements depicting the number of activities to be carried out for the successful execution of a particular task. The Units are: Bio-digester Technology, Bio-digester Construction/installation, Occupational Health and Safety Procedures, and Entrepreneurship.

UNIT 1 [This Unit covers the skills and knowledge required by a Bio-digester Plant constructor to have an in-depth understanding of the bio-digester system.

Unit No.	01
Unit Title	BIO-DIGESTER TECHNOLOGY
Description	This Unit describes the knowledge, skills and appropriate attitudes required to apply fundamentals of bio-digester technology in construction and installation of bio-digesters effectively and efficiently.
Scope	This unit covers the following: <ul style="list-style-type: none"> • Operation of a bio-digester plant • Construction of a bio - digester plant • Maintenance of a bio - digester plant • Types of bio-digester • Components of the bio-digester feedstock for the bio-digester • Bio-digester products and their uses
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Principle of operation of a bio-digester plant	To be competent, the individual must be able to: PC1. Define a bio-digester PC2. Describe the physical process of the bio-digester PC3. Describe the chemical process of the bio-digester
Types of bio-digester	To be competent, the individual must be able to: PC5. Identify the working principle and the types of bio-digesters PC6. Describe the types of bio-digesters and their suitability in given context PC7. Outline the advantages of the different types of bio-digesters PC8. Outline the disadvantages of the different types of bio-digesters
Components of the bio-digester	To be competent, the individual must be able to: PC9. Identify the components of the bio-digester PC10: Describe the components of the bio-digester and their functions/working principle PC 11. Describe the functions of the components of the bio-digester
Feedstock for the bio-digester	To be competent, the individual must be able to: PC12. Identify the sources of feedstock PC13. Identify inhibitory factors PC14. Discuss gas production PC15. Discuss the carbon nitrogen ratio in feedstock and water-feedstock ratio
The bio-digester products	To be competent, the individual must be able to: PC16: Identify the digester products PC17. Discuss the composition of the biogas PC18. Discuss the uses of biogas PC19. Describe the composition of bio-slurry PC20. Describe the uses of bio-slurry

Knowledge and Understanding (K)	
A. Organisational Context (Knowledge of the company/ organisation and its processes)	The individual on the job must demonstrate knowledge and understanding of: OK1. Standard ratio of water and solids mix of feedstock. OK2. The processes of the bio-digesters. OK3. The types of bio-digesters. OK4. The advantages and disadvantages of the different types of bio-digesters. OK5. The components of the bio-digester. OK6. Identify inhibitory factors of bio-digesters
B. Technical Knowledge	The individual on the job must demonstrate knowledge and understanding of: TK1. Understand the processes involved in methane production TK2. Understand the different types of feed stock for methane production TK3. Understand the usage of biogas for cooking and bio slurry to use as organic fertiliser
C. Regulatory context (Knowledge of Rules and Regulations)	The individual on the job must demonstrate knowledge and understanding of : RK1. Government regulatory agency requirements (ZEMA, NCC, Local Authority & EIZ/Eng.RB)
Skills (S)	
A. Core Skills/ Generic Skills	Reading Skills
	The individual on the job must be able to: CS1. Read and interpret internal/external documents. CS2. Read and understand manuals, health and safety instructions, memos, other company documents.
	Writing Skills
	The individual on the job must be able to : CS3. Fill up documentation applicable to one's role.
	Oral Communication (Listening and Speaking skills)
	The individual on the job must be able to : CS4. Express statements or information clearly so that others can hear and understand. CS5. Participate in and understand the main points of simple discussions. CS6. Respond appropriately to any queries. CS7. Communicate with supervisor.
B. Professional Skills	Decision Making
	The individual on the job must be able to: PS1. Follow organization rule-based decision-making process. PS2. Take decision with systematic course of actions and/or response.
	Plan and Organise
	The individual on the job must be able to : PS3. Plan and organise work to meet deadlines. PS4. Work constructively and collaboratively with others.

	Customer Centricity
	The individual on the job must be able to: PS5. Follow code of conduct. PS6. Manage relationships with customers with intent on satisfying its requirements for service delivery.
	Problem Solving and Decision Making
	The individual on the job must be able to: PS7. Recognize problems and search for solutions. PS8. Choose best methods to complete assigned tasks. PS9. Approach relevant authority when required.
	Analytical Thinking
The individual on the job must be able to: PS10. Apply domain knowledge, observations and data to select course of action to perform tasks related to bio-digester technology.	
Critical Thinking	
The individual on the job must be able to: PS11. Critically evaluate information obtained from customers, supervisor and co-workers to perform day to day activities. PS12. Ask questions for better understanding.	

UNIT 2 [This Unit covers the skills and knowledge required by a Bio-digester Plant constructor to be proficient in constructing/installing Bio-digesters of different types].

Unit No.	02
Unit Title	BIO-DIGESTER CONSTRUCTION
Description	This Unit describes the knowledge, skills and appropriate attitudes to construct and/or install bio-digester.
Scope	This unit/task covers the following: <ol style="list-style-type: none"> 1. Carry out technical survey 2. Drawings 3. Select materials 4. Identify Types of soils 5. Identify the topography of the area
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Carry out Feedstock analysis	To be competent, the individual must be able to: PC1. Carry out Feedstock analysis, that is, <ul style="list-style-type: none"> • Quantity and Quality of the feeding materials <ul style="list-style-type: none"> ➤ Type of livestock ➤ Number of live-stock ➤ Livestock grazing practice ➤ Types of cattle shed ➤ Dung collection potential ➤ Type of feed and quantity • Availability of water Free from <ul style="list-style-type: none"> ➤ Heavy metals ➤ Antibiotics ➤ Detergents ➤ Organic solvents
Interpret drawings	PC2. Interpret drawing <ul style="list-style-type: none"> • The meaning of lines <ul style="list-style-type: none"> ➤ Centre line ➤ Visible lines ➤ Hidden line ➤ Extension lines ➤ Dimension lines ➤ Leader lines ➤ Brake lines ➤ Long and short ➤ Phantom or datum ➤ Stitch line ➤ Cutting or viewing plane

Select materials	<p>To be competent, the individual must be able to:</p> <p>PC3. Select materials</p> <p>PC4. Determine the quality of standard of construction materials and appliances</p> <ul style="list-style-type: none"> • Construction Materials <ul style="list-style-type: none"> ➤ Cement ➤ Sand ➤ Aggregates ➤ Bricks / blocks • Pipes and Alliances <ul style="list-style-type: none"> ➤ Inlet pipes ➤ Gas pipe ➤ Fitting ➤ Gas stove ➤ Water drain ➤ Gas valve
Types of soils	<p>To be competent, the individual must be able to:</p> <p>PC5. Identify types of soils</p> <ul style="list-style-type: none"> • Soil condition • Clay soil • Sandy soil • Loamy soil • Silt soil
Topography of the area	<p>To be competent, the individual must be able to:</p> <p>PC6. Site of the bio-digester:</p> <ul style="list-style-type: none"> • Elevation • Slop • Hills • Drainage systems
Knowledge and Understanding (K)	
A. Organisation-al Context (Knowledge of the company/ organisation and its processes)	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>OK1. Quality construction materials.</p> <p>OK2. Standard Operation and maintenance procedures.</p> <p>OK3. Safety on handling of bio-digester products.</p> <p>OK4. Maintenance of tools and equipment.</p> <p>OK5. Standard specifications for all brickwork tools and equipment, their care and maintenance.</p> <p>OK6. How to use basic levelling tools in brickwork works such as spirit level, water level, plumb bob and line thread</p> <p>OK7. How to select and use tools and equipment</p> <p>OK8. How to determine vertical and horizontal alignment using appropriate tools to provide vertical datum lines</p>

<p>B. Technical Knowledge</p>	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>TK1. Identifying the different types of drawings TK2. Able to interpret different types of drawings TK3. standard specifications and quality of construction materials TK4. Setting Out of a bio-digester plant and identifying errors in setting out TK6. how to use basic levelling tools in brickwork works such as spirit level, water level, plumb bob and line thread TK7. how to select and use tools and equipment TK8. how to determine vertical and horizontal alignment using appropriate tools to provide vertical datum line.</p>
<p>C. Regulatory context (Knowledge of Rules and Regulations)</p>	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>RK1. Government regulatory agency requirements (ZEMA, NCC, Local Authority & EIZ/Eng.RB).</p>
<p>Skills (S)</p>	
<p>A. Core Skills/ Generic Skills</p>	<p>Reading Skills</p> <p>The individual on the job must be able to:</p> <p>CS1. Read and interpret internal/external documents. CS2. Read and understand manuals, health and safety instructions, memos, other company documents.</p> <p>Writing Skills</p> <p>The individual on the job must be able to:</p> <p>CS3. Fill up documentation applicable to one's role.</p> <p>Oral Communication (Listening and Speaking skills)</p> <p>The individual on the job must be able to:</p> <p>CS4. Express statements or information clearly so that others can hear and understand. CS5. Participate in and understand the main points of simple discussions. CS6. Respond appropriately to any queries. CS7. Communicate with supervisor.</p>
<p>B. Professional Skills</p>	<p>Decision Making</p> <p>The individual on the job must be able to:</p> <p>PS1. Follow organization rule-based decision-making process. PS2. Take decision with systematic course of actions and/or response.</p>

	Plan and Organise
	The individual on the job must be able to: PS3. Plan and organise work to meet deadlines. PS4. Work constructively and collaboratively with others.
	Customer Centricity
	The individual on the job must be able to: PS5. Follow code of conduct. PS6. Manage relationships with customers with intent on satisfying its requirements for service delivery.
	Problem Solving and Decision Making
	The individual on the job must be able to: PS7. Recognize problems and search for solutions. PS8. Choose best methods to complete assigned tasks. PS9. Approach relevant authority when required.
	Analytical Thinking
	The individual on the job must be able to: PS10. Apply domain knowledge, observations and data to select course of action to perform tasks related to construction and installation of a bio-digester.
	Critical Thinking
	The individual on the job must be able to: PS11. Critically evaluate information obtained from customers, supervisor and co-workers to perform day to day activities. PS12. Ask questions for better understanding.

UNIT 3 [This Unit covers the skills and knowledge required by a Bio-digester Plant constructor to adhere to Occupational Health and Safety Procedures related to bio-digester technology

Unit No.	3
Unit Title	OCCUPATIONAL HEALTH AND SAFETY PROCEDURES
Description	This Unit describes the skills and knowledge required to equip BDC with appropriate attitudes to apply occupational, health and safety.
Scope	This unit covers the following: <ul style="list-style-type: none"> • Occupational Health and Safety procedures • Environmental Protection Measures • Local Risk Control • Construction safety standards • Green technology in building
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Occupational Health and Safety procedures	To be competent, the individual must be able to: PC1. Identify possible hazards during plant construction PC2. Discuss common injuries during construction PC3. Apply first aid concepts PC4. Observe health practices PC5. Apply lifesaving skills
Environmental Protection Measures	To be competent, the individual must be able to: PC4. Dispose solid waste PC5. Dispose toxic waste issues PC6. Observe sanitation on site (In - situ) PC4. Use personal protective equipment
Local Risk Control	To be competent, the individual must be able to: PC6. Identify hazards
Construction Safety Standards	To be competent, the individual must be able to: PC6. Adhere to legal requirements PC7. Comply with statutory requirements PC8. Adhere to environmental regulations
Green Technology in Building	To be competent, the individual must be able to: PC9. Analyse renewable energy and energy conservation requirement PC10. Analyse the purification of gas PC11. Carry out solid waste management

Knowledge and Understanding (K)	
A. Organisational Context (Knowledge of the company/ organisation and its processes)	The individual on the job must demonstrate knowledge and understanding of: OK1. safety rules and regulations for handling and storing required biogas, bio-slurry, tools, equipment, and materials OK2. personal protection including the use of related safety gears and equipment OK3. how to request for tools and materials as per set procedures
B. Technical Knowledge	The individual on the job must demonstrate knowledge and understanding of: TK1. Identify hidden hazards TK2. Knowledge of regulatory organisation TK3. Gathering and interpreting data TK4. Accountability
C. Regulatory context (Knowledge of Rules and Regulations)	The individual on the job must demonstrate knowledge and understanding of: RK1. Government regulatory agencies (ZEMA, NCC & EIZ/Eng.RB)
Skills (S)	
A. Core Skills/ Generic Skills	Reading Skills
	The individual on the job must be able to: CS1. Read and interpret internal/external documents. CS2. Read and understand manuals, health and safety instructions, memos, other company documents.
	Writing Skills
	The individual on the job must be able to: CS3. Fill up documentation applicable to one's role.
A. Core Skills/ Generic Skills	Oral Communication (Listening and Speaking skills)
	The individual on the job must be able to : CS4. Express statements or information clearly so that others can hear and understand. CS5. Participate in and understand the main points of simple discussions. CS6. Respond appropriately to any queries. CS7. Communicate with supervisor
B. Professional Skills	Decision Making
	The individual on the job must be able to: PS1. Follow organization rule-based decision-making process. PS2. Take decision with systematic course of actions and/or response.

	Plan and Organise
	The individual on the job must be able to: PS3. Plan and organise work to meet deadlines. PS4. Work constructively and collaboratively with others.
	Customer Centricity
	The individual on the job must be able to: PS5. Follow code of conduct. PS6. Manage relationships with customers with intent on satisfying its requirements for service delivery.
	Problem Solving and Decision Making
	The individual on the job must be able to: PS7. Recognize problems and search for solutions. PS8. Choose best methods to complete assigned tasks. PS9. Approach relevant authority when required.
	Analytical Thinking
	The individual on the job must be able to: PS10. Apply domain knowledge, observations and data to select course of action to perform tasks related to occupational health and safety
	Critical Thinking
	The individual on the job must be able to: PS11. Critically evaluate information obtained from customers, supervisor and co-workers to perform day to day activities. PS12. Ask questions for better understanding.

UNIT 4 [This Unit covers the knowledge required by a Bio-digester Plant constructor in entrepreneurship skills].

Unit No.	4
Unit Title	ENTREPRENEURSHIP
Description	This Unit describes the skills and knowledge required to equip BDC with appropriate attitudes to run profitable enterprises efficiently.
Scope	This unit covers the following: <ul style="list-style-type: none"> • Positive attitude towards entrepreneurship • Personal entrepreneurial skills • Agreements and contracts • Awareness on bio-digester market – demand and supply situation
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Positive attitude towards entrepreneurship	To be competent, the individual must be able to: <ul style="list-style-type: none"> PC1. Develop positive thinking. PC2. Develop positive ambition. PC3. Discuss positive outlook. PC4. Develop habits of team works PC5. Develop Market Intelligence
Personal entrepreneurial	To be competent, the individual must be able to: <ul style="list-style-type: none"> PC4. Identify competences relating to achievement cluster. PC5. Assess competences relating to planning cluster. PC6. Apply competences relating to power cluster. PC7 Identify bio-digester market enablers and spoilers elements
Agreements and contracts	To be competent, the individual must be able to: <ul style="list-style-type: none"> PC6. Use different approaches of negotiations. PC8. Prepare for negotiations. PC9. Manage contracts PC10 Motivation and negotiations.
Knowledge and Understanding (K)	
A. Organisation-al Context (Knowledge of the company/ organisation and its processes)	The individual on the job must demonstrate knowledge and understanding of: <ul style="list-style-type: none"> OK1. The mind-set of a positive entrepreneur OK2. Positive thinking and goal setting OK3. Practice Opportunity Seeking and Initiative OK4. Practice Commitment to the Work Contract OK5. Practice Persuasion and Networking OK6. Practice Independence and self-confidence

	OK7. Basic types of negotiations, the phases of negotiations, and the skills needed for successful negotiating
B. Technical Knowledge	The individual on the job must demonstrate knowledge and understanding of: TK1. Strategic thinking and planning skills TK2. networking skills TK3. Communication and listening TK4. Teamwork and leadership skills
C. Regulatory context (Knowledge of Rules and Regulations)	The individual on the job must demonstrate knowledge and understanding of: RK1. Government regulatory agencies (ZEMA, NCC & EIZ/Eng.RB)
Skills (S)	
A. Core Skills/ Generic Skills	Reading Skills
	The individual on the job must be able to: CS1. Read and interpret internal/external documents. CS7. Have qualities of a good negotiators CS2. Read and understand manuals, health and safety instructions, memos, other company documents.
	Writing Skills
	The individual on the job must be able to: CS3. Fill up documentation applicable to one's role.
B. Professional Skills	Oral Communication (Listening and Speaking skills)
	The individual on the job must be able to: CS4. Express statements or information clearly so that others can hear and understand. CS5. Participate in and understand the main points of simple discussions. CS6. Respond appropriately to any queries. CS7. Communicate with supervisor
B. Professional Skills	Decision Making
	The individual on the job must be able to: PS1. Follow organization rule-based decision-making process. PS2. Take decision with systematic course of actions and/or response.

	Plan and Organise
	The individual on the job must be able to: PS3. Plan and organise work to meet deadlines. PS4. Work constructively and collaboratively with others.
	Customer Centricity
	The individual on the job must be able to: PS5. Follow code of conduct. PS6. Manage relationships with customers with intent on satisfying its requirements for service delivery.
	Problem Solving and Decision Making
	The individual on the job must be able to: PS7. Recognize problems and search for solutions. PS8. Choose best methods to complete assigned tasks. PS9. Approach relevant authority when required.
	Analytical Thinking
	The individual on the job must be able to: PS10. Apply domain knowledge, observations and data to select course of action to perform tasks related to negotiations of business relating to bio-digesters Systems.
	Critical Thinking
	The individual on the job must be able to: PS11. Critically evaluate information obtained from customers, supervisor and co-workers to perform day to day activities. PS12. Ask questions for better understanding.

5. EQUIPMENT, TOOLS AND CONSUMABLE MATERIALS

These may include, but not limited to:

- (i) **Good Quality Construction materials** (Cement, Sand, Stone/Brick, Aggregate, Acrylic Emulsion Paint, Mild Steel Rod, Glue (liquid gasket)/Teflon tape, Water)
- (ii) **Personal protective equipment (PPE)** (Head Protection/Safety Helmets/Hard Hat, Foot Protection/Safety Shoes, Protective Clothing/Reflected Vests, Eyes and Face Protections, Hand Protection, Hearing Protection, Safety Belts/Safety Harness)
- (iii) **Construction tools**
 - Hand tools, such as; screwdrivers, brushes, trowels, wrenches, knives, crimpers, clamps
 - Power tools, which may be powered by electricity, compressed air, liquid fuel, hydraulic power, or powder-actuated and might include mixers, saws, cutters, drills, grinders, guns, breakers etc.
 - Machine tools, used for shaping materials into components by cutting, boring, grinding etc.

6. DILEMMAS/CHALLENGES AND COMPLEXITIES FOR A JOB HOLDER

Dilemmas associated with the job of a Bio-digester Plant Constructor include working in dangerous areas and hazardous machinery/equipment, working in confined areas, long working hours, exposure to chemical, physical and biological hazards, pressure from supervisors and colleagues, time pressure to complete tasks, pressure from government regulators, working in extreme weather such as hot and cold conditions, working in noisy, wet and dusty environments, etc.

6.1. Alternative Choices (Solutions) to Dilemmas and Complexities

Solutions to dilemmas include wearing protective clothing (PPE) and ensuring their availability and use by other employees, exercising regularly to maintain physical fitness, participating in workplace safety sensitisation and awareness meetings/training sessions, planning your daily tasks, reading and researching new ways to handle work stress, adhering to company's safety and standard operating procedures at all times, consulting extensively within and outside one's department/team on safety and other issues.

7. WORKING CONDITIONS/ENVIRONMENT

Working conditions include working in cold, hot and wet conditions, working at heights, stand/walk for long hours, working in shifts, areas that are noisy and dusty, areas with limited lighting and ventilation. Working in confined spaces, working in explosives environment.

8. PARTIES INVOLVED/INTERACTING WITH THE JOB HOLDER OR TRAINEE

8.1 Internal/Within the Organization

Parties involved/interacting with the job holder who are internal to the organization include supervisors, subordinates, and other employees (e.g. architects, surveyors, engineers: civil, building, electrical and mechanical), trainers, safety team, etc.

8.2 External/Outside the Organisation

Parties involved/interacting with the job holder who are external include customers/clients, trainers, government regulators, trainers, suppliers of equipment/tools/consumables, fellow Bio-digester Constructors from other companies, labour unions/occupational health and safety associations, etc.

9. PHYSICAL DEMANDS ON THE BODY

- Physique to sustain strenuous conditions;
- Be able to walk and stand for long periods of time;
- Bend, stretch, twist, or reach out;
- Be able to lift relatively heavy materials, tools and equipment;
- Be able to use fingers, hands and feet with ease to complete the assigned task (dexterity).

ANNEX A

Criteria for Assessments based on this NOS

A.1 Guidelines for Assessment

A.1.1 Criteria for assessment for curricula and learning programmes based on this NOS will be created by curricula and programmes developers. Each Performance Criteria (PC) will be assigned marks proportional to its importance in the NOS. Curricula and programmes developers will also lay down proportion of marks for theory and practical skills for each performance criteria, giving more weight to practical skills.

There shall be allocated the 'Total Mark', which will be the sum of all marks in each Unit, distributed across the number of PCs in that particular Unit. The 'out of' mark will be the mark allocated to each PC, which will be shared between theory and skills practical assessments.

A.1.2 Awarding/assessment bodies or institutions and other users of the NOS will create unique question papers for the theory part and evaluations for skill practical part for their respective candidates.

ANNEX B NOS Version Control

This Annex gives details necessary for the tracking of the NOS versions based on the number of revisions.

NOS Code	NOS.BDC.01		
ZQF Level	Level 3	Version Number	01
Sector	Energy	Date of Approval	September 2021
Sub Sector	Renewable Energy	Date of Last Review	N/A
Occupation	Bio-digester Constructor	Date of Next Review	September 2026