



MINISTRY OF LABOUR & SOCIAL PROTECTION

**NATIONAL INDUSTRIAL TRAINING AUTHORITY
CURRICULUM**

FOR

**BIOGAS SYSTEM INSTALLER I
KNQF LEVEL 4**

NATIONAL SKILL CERTIFICATE (NSC) III



[PARTNER LOGOS-GIZ, SNV, ABPL, BIONET, EPRA]

June 2023

Summary and Time Allocation for Biogas Systems Installer I

Group	Topic	Sub-Topic	Time Allocation (Hours) / Volume of Learning SUG		
			Theory (Hrs) (20%)	Practical (Hrs) (80%)	Total (Hrs)
BSI4 1.0	Health and Safety	<ol style="list-style-type: none"> 1. Potential hazards and mitigation 2. Personal safety e.g. PPEs 3. Safety and Gender Considerations 4. Tools and Equipment safety 5. Safety of other persons in the workplace 6. Statutory Requirements 	16	64	80
BSI4 2.0	Tools and equipment	<ol style="list-style-type: none"> 1. Measuring 2. Marking 3. Cutting 4. Fastening 5. Forming tools 6. Plastering 7. Mixing tools 8. Digging tools 9. Plumbing 10. Guiding and Testing 	12	48	60
BSI4 3.0	Introduction to Biogas Technology	<ol style="list-style-type: none"> 1. Background of biogas 2. Applications of biogas and bio-slurry. For biogas 3. Benefits of Biogas 4. Drawbacks of Biogas 5. Drivers for Biogas 	12	48	60

Group	Topic	Sub-Topic	Time Allocation (Hours) / Volume of Learning SUG		
			Theory (Hrs) (20%)	Practical (Hrs) (80%)	Total (Hrs)
		6. Technology uptake 7. Anaerobic Digestion (AD) 8. Classification of AD processes			
BSI4 4.0	Biogas Plant Components	1. Feedstock Collection and Delivery System 2. Pre-treatment chamber 3. Mixing Chamber 4. Digester 5. Gas Storage 6. Outlet Chamber 7. Bio-slurry storage unit 8. Gas Delivery System 9. Biogas Upgrading Units 10. Appliances	10	40	50
BSI4 5.0	Biogas Models	1. Floating Drum 2. Fixed Dome 3. Tubular 4. Upward Anaerobic Sludge Blanket (UASB) 5. Lagoon 6. Dry Batch 7. Continuous Stirred Tank Reactor (CSTR) 8. Plug Flow Reactor (PFR)	10	40	50

Group	Topic	Sub-Topic	Time Allocation (Hours) / Volume of Learning SUG		
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BSI4 6.0	Feedstock	<ol style="list-style-type: none"> 1. Types of feedstock 2. Factors to consider in feedstock selection 3. Feedstock analysis 4. Feedstock handling <ol style="list-style-type: none"> a) 	16	64	80
BSI4 7.0	Introduction to Masonry	<ol style="list-style-type: none"> 1. Reading and interpreting drawings 2. Preliminary site works/ 3. Mortar works 4. Concrete casting 5. Stone Dressing 6. Brickwork 7. Walling 8. Formwork preparation 9. Steelworks 10. Finishing (rendering, plastering, painting) 	16	64	80
BSI4 8.0	Introduction to Plumbing	<ol style="list-style-type: none"> 1. Plumbing tools 2. Types, classes and uses of pipes 3. Fittings and Accessories 4. Appliances 5. Installation of Purification systems 6. Pipe Sizing 7. Pipe laying 	20	80	100

Group	Topic	Sub-Topic	Time Allocation (Hours) / Volume of Learning SUG		
			Theory (Hrs) (20%)	Practical (Hrs) (80%)	Total (Hrs)
BSI4 9.0	Surveying related to biogas systems	<ol style="list-style-type: none"> 1. Site Surveying 2. Measurements and levelling 3. Surveying tools and procedure 4. Preparation surveying report 	10	40	50
BSI4 10.0	Installation of prefabricated Biogas System	<ol style="list-style-type: none"> 1. Installation tools and equipment 2. Inspection of components and fittings 3. Assembling and installation procedure as per the product manual 4. Testing procedure 	20	80	100
BSI4 11.0	Construction of masonry biogas systems	<ol style="list-style-type: none"> 1. Construction tools 2. Mobilization of materials 3. Checking of material quality 4. Construction procedure as per the manual 5. Quality tests and inspection 	24	96	120
BSI4 12.0	Biogas Plant testing and commissioning	<ol style="list-style-type: none"> 1. Testing and Commissioning tools and instruments 2. Testing and Commissioning procedure 3. Inspection report 4. Charging as per product manual 	16	64	80

Group	Topic	Sub-Topic	Time Allocation (Hours) / Volume of Learning SUG		
			Theory (Hrs) (20%)	Practical (Hrs) (80%)	Total (Hrs)
		5. Customer training			
GS4	Generic Skills	1. Introduction to Technical Drawing 2. Introduction to ICT 3. Introduction to Communication Skills 4. Introduction to Life Skills 5. Introduction to Entrepreneurship 6. Basic Mathematics and science 7. Gender Mainstreaming and Social inclusion. 8. Professional Ethics	12	48	60
			194	776	970

Annex 1: Standards for Training Institution/Assessment Centre

1. Floor Area requirements

The number of trainees per floor area is controlled to ensure effective supervision and safety.

Skill Area	Floor Space (M ²)				
	<i>18</i>	<i>20</i>	<i>21</i>	<i>25</i>	<i>30</i>
Maximum Trainees					
Generic Courses/Maths/Basic sciences	66±1	77±6	80±6	92±7	107±8
Textiles/ICT/Electronics/Control Systems/Graphics	82±5	87±4	91±5	103±4	123±8
Food & Beverage/Hair & Beauty	93±5	97±6	101±6		
Engineering/Technology	104±5	109±6	113±6		

2. Storage requirements

S/No.	Materials	Requirements
1.	Textile, timber, metal, plastic	-Designated storage area; separate and adjacent to the workshop; easily accessible
2.	Food	-Stored separate (dry & shelf stable, fresh fruit & vegetables, frozen & perishable foods)
3.	Hazardous substances	-Separate storage for chemicals, flammable liquids, LPG, oxy-acetylene (NB: minimum possible quantities should be stored at any given time)

3. Lighting

S/No.	Activity	Requirements
1.	Food preparation area	-natural light (500 lx); fluorescent lighting (min colour rendering index (Ra=80 to prevent food colour distortion)
2.	Normal bench and machine work	-at least 500 lx (NB: at least 1000 lx for fine bench and machine work)

3.	Fabric work	-at least 500 lx
4.	Forging, brazing and welding	-subdued lighting
5.	Computer VDUs	-facing away from glare and reflections from lights and windows

4. Floor surfaces

S/No.	Activity	Requirements
1.	Design & technology	-located on one floor
2.	Heat treatment	-fire resistant
3.	Food handling	-washable and cleaned on daily basis
4.	Textile	-not carpeted to prevent injury from pins, needles...
5.	Routine	-spilt water, oil or other liquids should be cleaned immediately; daily cleaning; removal of obstacles and cables lying on the floor

Annex 2: Minimum tools and equipment required for accreditation

ITEM	Items Description	Number	Type	Remarks
Tools Needed	Try Square.	20		
	Steel rule	20		
	Tape measure	20		
	Mason square	20		
	pH meter	1		
	thermometer	5		
	biogas analyser (portable)	1		
	GPS	1		
	Pressure gauge	5		
	Chalk string	20		
	Scribers	20		
	Straight edge	20		

ITEM	Items Description	Number	Type	Remarks
	Trammel	5		
	Template	20		
	Marking gauge	20		
	Pegs	20		
	Pen	20		
	Guide pipe/centre pipe	5		
	Laser markers	2		
	Handsaws	20		
	Hacksaws	20		
	Pangas/machete	20		
	Axes	4		
	Grinders	5		
	Pipe cutter	5		
	Chain saw	1		
	Pliers (snipping tools)	5		
	Laser cutters (optional)	1		
	G-Clamps	5		
	Pipe Vices	5		
	Bench vices	5		
	Braces	5		
	Spanners (assorted)	5 sets		
	Screw drivers (assorted)	10 sets		
	Pipe wrench (assorted)	2		
	Chain wrench	4		
	Hammers (claw, ball-pen, masons, sledge)	5		
	Mallet	2		
	Chisels (wood,)	5		
	Chisels (cold)	20		
	Chisels (masons)	20		
	Chisels (bolster)	20		
	Trowels	20		
	Floats (wooden and steel)	1		
	Spade	2		
	Shovel	2		
	Straight edge	10		
	Spade/shovel	10		
	Concrete mixer	1		
	Wheelbarrow	5		
	Batching boxes	5		

ITEM	Items Description	Number	Type	Remarks
	Buckets	10		
	Stirrers and agitators	10		
	Excavators	1		
	Compressors	1		
	Augurs	1		
	Crowbar	5		
	Jembe/hoe	5		
	Mattock	5		
	Pneumatic drill	3		
	Fork jembe	5		
	Threading (stock and die, taps)	3		
	Welding (fusion welding, arc)	5		
	Bending (pipe benders)	1		
	Pipe cutter	3		
	Pipe wrench(assorted)	2 sets		
	Soldering gun	2		
	Spirit level	10		
	Plumb bob	20		
	Mason Square	5		
	Laser tools	2		
	Hand pump (pressure test)	1		
	Compressor	1		
	Pressure gauge	5		
	Wire brush	20		
	Sander	1		
	Round Files (assorted)	5		
	Flat Files (assorted)	5		
	Square Files (assorted)	5		
	Triangular Files (assorted)	5		
	Half Round Files (assorted)	5		