Specification for the design, fabrication, delivery, and on-site commissioning of Three (3) Complete 1 000 L IBC-Based Biogas Reactor Systems

AGRICULTURAL RESEARCH COUNCIL (NRE: AE)

1. Introduction

The Agricultural Research Council (ARC) invites suitably qualified and experienced service providers to submit quotations for the design, fabrication, delivery, installation, testing, commissioning, and training for a complete 1000 L IBC-based biogas reactor system, including all components required for a fully functional small-scale anaerobic digestion and biogas production unit.

Figure 1 illustrates an example of the required 1000 L IBC reactor tank.

Figure 1 : Example of a 1000 L IBC reactor tank

2. Scope of Work

The Supplier shall design, fabricate, deliver, install, test, commission, and provide training for a complete biogas reactor system comprising the following:

• New 1 000 L food-grade IBC anaerobic digester

• Biogas collection, handling, and storage system

• Gas piping, valves, filters, gas bag, and booster pump

• Greenhouse enclosure heating system

• IBC heating blanket/jacket

• Mechanical stirring system

• Biogas appliance (cast iron gas stove)

• Gas flow meter/gas counter with data logging capability

• All fittings, connectors, valves, supports, and accessories required for a complete operational system

• Assembly drawings, operating manuals, maintenance manuals, and warranty documentation

3. Technical specifications

3.1 System components

Component	Specifications
Reactor tank	Tank description: - Black 1 000L IBC (Intermediate Bulk Container) -UV-stabilised polyethylene -External galvanised steel cage for support -Bottom steel pallet Base: Integrated IBC pallet, min. load 1500 kg Tank modifications: -Gas outlet nozzle, -Sealed feed inlet -Sensor ports -Effluent outlet
Biogas collection & storage	Gas outlet at the top Gas piping Gas storage:Minimum 500 L flexible gas storage bag manufactured from UV-resistant PVC-coated fabric or equivalent suitable material. Gas filtration: moisture trap and H_2S filter Booster pump: 0.5–2 m^3/h, low-pressure biogas pump Automated gas flow meter/gas counter with data logging capability (e.g. BPC Titan, Smart Biogas, or approved equivalent).
Stirring system	0.37 -0.55 kW tank mixer Impeller made of Stainless steel (non- corrosive)

	Folding impeller type Top-mounted, with an easily removable mounting frame
Heating system	IBC heating blanket (see Figure 2) Greenhouse enclosure (see Figure 3) 6 mm twin-wall polycarbonate sheeting for cladding

3.2 Materials & Fabrication Requirements

- All slurry-contact surfaces shall be manufactured from HDPE, PVC, stainless steel 304/316, or EPDM materials.
- All gas-contact surfaces shall be gas-tight and corrosion-resistant.
- All penetrations shall be sealed using appropriate bulkhead fittings or welded flanges.
- The greenhouse enclosure shall be properly sealed and edged.
- The complete system shall be suitable for continuous outdoor operation under South African environmental conditions.
- Workmanship shall comply with good engineering practice.

4. Delivery and assembly of the biogas system

The supplier shall:

- Deliver all equipment to the ARC designated site.
- Install and assemble the complete system on-site.
- Ensure all equipment is adequately protected against mechanical damage and moisture during transportation.
- Clearly label the system with all required operational and safety labels, including “Biogas – Flammable”.
- Provide all tools, consumables, and labour necessary for installation and commissioning.

5. On-site quality testing, commissioning, and training

Following installation, the supplier shall perform the following:

- Hydraulic leak testing of the reactor system
- Gas leak testing at operating pressures of 20–30 mbar
- Functional testing of:
  - Stirring system
  - Gas booster pump
  - Gas filtration system
  - Gas flow meter

- Gas stove

• Verification of greenhouse enclosure integrity

• Verification of overall assembly quality

The supplier shall provide on-site operator training covering:

- System operation
- Feeding procedures
- Safety requirements
- Routine maintenance
- Troubleshooting procedures

Figure 2 Greenhouse enclosure heating system

Figure 3 Heating blanket

Figure 4 Top mounted stirring mixer

6. Documentation to Be Supplied

The Supplier must provide:

- Assembly drawings/layout diagrams
- Operating & Maintenance Manual
- The bidder shall submit a written warranty undertaking confirming the minimum warranty period, the components covered by the warranty, and the procedure for warranty claims. Warranty certificate(s) for all supplied components shall be submitted upon delivery and successful commissioning of the system.
- Spare parts list with pricing (filters, pump, valves, gas bag)

7. Warranty

The Supplier shall provide:

- Minimum 12-month warranty against material and manufacturing defects
- Warranty coverage for: reactor, greenhouse enclosure, gas bag, pump, valves, filters, stove

8. Supplier Information Required with Quotation

Suppliers must include the following in their RFQ response:

- Company profile highlighting relevant experience in fabricating and supplying biogas units
- Proof that the supplier has fabricated at least two biogas reactors. This can include lab-scale reactors, provided the lab units had a stirring system and were heated.
- 3 client referrals/recommendation letters
- Lead time for fabrication and delivery
- Warranty terms

9. Special Conditions

The successful bidder shall comply with the following special conditions:

- Deliver, install, test and commission the complete biogas reactor system at the ARC designated site within the agreed lead time.
- A contingency of up to **15% of the original contract value** may be considered where unforeseen work directly related to the original scope of work becomes necessary during the execution of the project. Any utilisation of the contingency shall be supported by a detailed written motivation, cost breakdown, and justification by the end-user and shall be subject to prior written approval by the delegated authority in accordance with the ARC SCM Policy. No additional work shall commence without such written approval.
- Provide on-site training to ARC personnel on the operation, maintenance, safety procedures and troubleshooting of the biogas reactor system upon successful commissioning.
- Rectify, at no additional cost to the ARC, any defects identified during the warranty period resulting from faulty workmanship, defective materials or installation within a reasonable period after notification.
- Replace, at no additional cost to the ARC, any component found to be defective during delivery, installation or commissioning with a new component of equivalent or superior specification.
- Final acceptance of the biogas reactor system shall be subject to successful installation, testing, commissioning and written acceptance by the ARC Project Manager or delegated representative.

- Submit all operating manuals, maintenance manuals, warranty certificates, assembly drawings and commissioning records upon successful completion of the project.
- Ensure that all installation activities comply with the applicable **Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)** and all other applicable South African legislation and safety requirements.
- Supply only new, unused and defect-free materials, components and equipment that comply with the technical specifications contained in this RFQ.
- Provide after-sales support for all supplied equipment and components during the warranty period. Such support shall include technical assistance, troubleshooting, and the repair or replacement of defective components covered under the warranty at no additional cost to the ARC.

10. **Compulsory Requirements**

Failure to submit the documents listed below with the quotation will result in disqualification.

The bidder shall submit the following:

- A company profile demonstrating experience in the design, fabrication, supply, installation and commissioning of biogas systems or similar anaerobic digestion systems.
- A minimum of three (3) client reference letters or recommendation letters as proof of having successfully fabricated and supplied at least two (2) biogas reactors. Laboratory-scale reactors will be accepted, provided that such reactors incorporated both a heating system and a mechanical stirring system.
- A warranty undertaking on the bidder's official company letterhead, duly signed by an authorised representative, confirming a minimum warranty period of twelve (12) months, the components covered by the warranty, and the procedure for submitting warranty claims. Warranty certificate(s) for all supplied components shall be submitted upon delivery and successful commissioning of the system.
- The original manufacturer's technical datasheets and product brochures for all major components proposed, including but not limited to the IBC tank, gas flow meter, gas booster pump, heating blanket, stirring system, gas storage bag and greenhouse enclosure materials. The submitted documentation shall clearly identify the manufacturer, model or product designation, and technical specifications demonstrating compliance with this RFQ. Generic brochures,

copied images, catalogue extracts without technical specifications, or self-generated product information shall not be accepted.

- A detailed project implementation schedule indicating the proposed fabrication, delivery, installation, testing, commissioning and handover activities, together with the estimated lead time and key project milestones from the date of receipt of an official purchase order.

11. Pricing schedule

	Item	Unit	Unit Cost	Qty	Total

1	Design of biogas units including detailed drawings , BOQ and materials specification	Each		1	
2	Fabrication of biogas units including: (i) 3 x I 000 L IBC Reactor tank, (ii) 3 x gas collection, handling and storage (iii) 1 x greenhouse enclosure (iv) 1x IBC heating blanket (v) 3 x gas counter	Each		1	
3	Delivery of 3 x biogas units	Each		1	
4	On -site assembling and quality testing of 3 biogas units	Each		1	
5	Start-up, commissioning & training ()	Each		1	
6	After sales support and M&E	Each		1	
7	15 % contingency	Each		1	