

## **SUPPLY & INSTALLATION OF BIOGAS PLANT**



### **N.S. MEMORIAL INSTITUTE OF MEDICAL SCIENCES**

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Sealed quotations are invited by the Secretary, Kollam District Co operative Hospital Society Q952 for the supply, installation & commissioning of Biogas Plant

**Eligibility:**

- Contractors who have sufficient experience of having successfully carried out similar works in Government Offices/Residential buildings/Office buildings/Pvt. buildings during the last three years are eligible to participate in the bidding.
- The NSMIMS reserves the right to verify the proof of having experience and expertise of the bidder in executing similar works and the bidder has to produce the proof thereof.

**Submission of bid:**

The tender document can be obtained in person from the below mentioned address from 10.00 am to 5.00 pm on all working days:

**“N.S Memorial Institute of Medical Sciences, Palathara, Thattamala P.O Kollam 691020 “**

Alternatively, the document can be downloaded from the website [www.nshospital.org](http://www.nshospital.org).

**Last date for submission:**

The last date for receipt of the bid at our office is **06.03.2023, 3.00 P.M.** The bid submitted beyond the above date and time shall not be considered for the bidding and shall be rejected

## **Installation & commissioning of Fixed Dome Bio Gas Plant**

**Capacity: 1000 kg/ day**

**Main digester volume - 137 m<sup>3</sup>**

### **Biomethanation technology**

Biogas technology involve anaerobic fermentation of organic waste materials, such as animal dung, canteen waste, night soil, agricultural waste, poultry and slaughter waste, market waste in a bio reactor for 35 to 45 days. Generation of biogas is governed by its pH value, temperature, carbon-nitrogen ratio; total solid content, Hydraulic retention time and chemical induces etc. The biogas so generated is a mixture of methane (65 to 70%) carbon dioxide (30-35%) and traces of hydrogen sulphide. This biogas does not contain Sulphur, so it is considered as clean and cheap fuel. A biogas provides better sanitation and hygiene. This gas can be used for thermal application and for generation of electricity.

### **Feed materials for bio gas plants**

Organic materials are used as feed materials for bio gas plants. Generally

1. Cattle dung
2. Human excreta
3. Kitchen/ vegetable waste
4. Slaughter house waste
5. Poultry droppings
6. Hotel/ Restaurants/ multistoried building wastes
7. Organic matter of higher fuel value etc

The proposed bio gas will have a total treatment capacity of 1000 kgs of food waste per day and liquid effluent of 2000 liters/day along with 1:1 ratio water. Its hydraulic retention time is 35-40 days, so the volume of the main digester is 137m<sup>3</sup>. The food waste when crushed with water in the machine, it is in a pre-digested form and the efficiency of the plant will be better.

### **Type of bio gas plant proposed**

**Fixed dome digester** bio gas plant is proposed. This digester functions on a continuous batch bases. It can digest plant waste as well as human and animal waste. It is usually built below ground level. The digester can be built from several materials.eg. bricks, cement, RCC, lime concrete and Ferro cement. This facilitates in introduction and use of local materials and man power. Pressure inside the digester does not cause any problem

### **Work Inclusions**

1. Waste collection segregation tank
2. Pulvoriser machine - 5 HP
3. Inlet to the bioreactor
4. Main Digester Tank
5. Balancing tank
6. Slurry collection tank
7. Gas collection chamber (Fixed dome)
8. Pre filter tank
9. Treated water collection tank and to ETP provision
10. Gas distribution system
11. Moisture removal systems
12. Bio gas measuring meter
13. Bio gas Booster pump
14. Bio gas burner
15. Man hole to the digester, balancing tank, pre-filter tank slurry tank
16. Initial feeding with cow dung
17. Trial run and handing over
18. Training to staff etc

**STRUCTURAL SPECIFICATIONS: FIXED DOME For 1000 kg/day**

(As per GO(MS) No 73/LSGD/ dated 01-03-2011)

<b>Sl no</b>	<b>Items</b>	<b>1000 kg/day capacity + food processed effluent</b>
1	Foundation	RR work at bottom 30 cm thick PCC, 1:4:8 at 20 cm thick, RCC 1:2:4, 8 &10 mm steel @ 20/20 cc 12 cm thick
2	Vertical Wall	Inner Cc block/ brick work 10 cm thick, outer brick masonry at 10 cm thick and RCC, 1:2:4 10 &8 mm steel @ 20/20 cc 12 cm thick
3	Bottom portion of main digester	PCC 20 cm, RCC, 1:2:4 10 &8 mm steel @ 20/20 cc
4	Dome portion	One layer Brick work 10 cm, 10 cm RCC 1:1.5:3, 8 mm steel @ 20/20 cc
5	Plastering	Cement mortar at1:4 at 10 cm thick all surface
6	Painting	Dome- two coat black paint inner side
7	Reinforcement details	Dome bottom and top 10 &8mm dia at 20 c/c Vertical wall 10 &8 mm at 20 c/c and 8mm at 20 c/c
8	Balancing or outlet tank	Bottom RR work RCC 1:2:4 at 12 cm , vertical wall brick work and inner and outer surface plastering 1:4 ratio and epoxy painting
9	Pre filter and septic tanks	Bottom RCC , vertical wall brick work and inner and outer surface plastering 1:4 ratio and epoxy painting
10	Slurry collection tank	Bottom RCC , vertical wall brick work and inner and outer surface plastering 1:4 ratio and epoxy painting
11	Sludge collection tank and provision to ETP	Bottom RCC , vertical wall brick work and inner and outer surface plastering 1:4 ratio and epoxy painting

## **Construction details**

### **1. Digester**

Digester tank is designed to treat 1000 kgs of food waste and 2000 liters' liquid waste per day with 40 days HRT mixed with water for food waste.

a. After site selection, earth excavation for digester in cylindrical shape will be done as per recommended specifications. Random rubble masonry with thickness 30 cm will be provided at the bottom foundation, if the soil is found loose sandy/ water stagnated area. Further, above over a layer of PCC 1:4:8, 20cm and RCC using 10 & 8mm steel at 20 c/c at 1:2:4 at 12cm thick for plants will be done at the bottom by providing with a slope of 1:6, for easy flow of slurry. Side walls will be constructed brick lining 10 cm, on both the sides and 12 cm RCC 1:2:4 inside the brick walls including fixing of inlet PVC pipe of 2.5m length. Fabrication of dome with brick lining 10cm thick, and RCC 12cm thick over the brick dome walls will be constructed. Outlet bucket pocket opening at .80m x .80m x .80m to balancing tank with RCC and brick work will also be provided. All inner walls are will be plastered and finished with 8mm thick cement mortar 1:3. Inner surface to be painted with black epoxy paints in two coats. Outlet balancing tank of brick masonry 23 cm thick with required volume capacity are also be constructed. The gas holder will be designed and hold 40% of the gas generated in a day.

### **b. Inlet mixing cum feeding tank**

Constructed out of brick masonry at 25 cm thick and plastered with cement mortar 1 in 3 circular in shape. The inlet device from the inlet mixing chamber feeds the waste into this tank and the normal waste which doesn't need any pulverizing is directly fed to this. This tank acts as the feeding tank to the digester.

### **c. Outlet balancing tank**

Outlet balancing tank will be constructed with brick masonry of 23 cm thick. with RCC Capacity of balancing tank is 18 m<sup>3</sup>

### **d. Initial feeding**

Initial feeding is done with fresh cow dung by properly mixing with water at 1:1 ratio

### **e. Gas distribution systems with bio gas burner**

PVC gas pipe line will be provided from plant to the kitchen by using 1.5" x 10 kg/cm<sup>2</sup> and 3/4" x 10 kg/cm<sup>2</sup> pvc pipe with moisture removal systems with valve and cock. One number of Bio gas burner of 24 CFt will also be provided.

## 2. Specification of waste disposer grinder 300 kg /hrs.

### **Chamber**

MS. 1.20 m X 75 cm size, Dia outer grinding chamber and 6'' Dia. Inner grinding chamber with special serrated Liner on the Top and perforated Screen groove at the bottom.

### **Feeding**

Through MS gravity Feed with slide gate.

### **Rotor Assembly**

EN-8 Rotor Shaft with special serrated MS Blades in outer and inner chamber fitted in two heavy duty Ball Bearings.

### **Power Required**

5 H.P. Electric Motor for rotor drive

### **Base**

Strong M.S. Structure fabricated out of MS channels.

### **Accessories**

'V' Belts, 'V' Belt Pulley, Cotton Bag, Balloon and three different types of sieves.

	<b>Specification of bio gas plants</b> <b>1000 kg/day</b>	<b>Diameter 8M,height 3 m</b>
<b>1</b>	<b>Organic loading rate/day( 6 Ltr/day/person)</b>	<b>1000 Kg/day</b>
<b>2</b>	<b>HRT</b>	<b>35 days</b>
<b>3</b>	<b>Main digester volume</b>	<b>137 m3</b>
<b>4</b>	<b>Balancing tank volume</b>	<b>18 m3</b>
<b>5</b>	<b>Slurry collection tank volume</b>	<b>8 m3</b>
<b>6</b>	<b>Pre-filter tank volume</b>	<b>8 m3</b>
<b>7</b>	<b>In let tank volume + gas pipeline and stoves</b>	<b>3 m3</b>
<b>8</b>	<b>Sump collection tank volume</b>	<b>6,000 L</b>
<b>9</b>	<b>Bio gas production per day</b>	<b>50 m3</b>
<b>10</b>	<b>Initial feeding with cow dung</b>	<b>60m3</b>

**Warranty:** Three-year (for the whole system)