

**PROCEEDINGS OF THE EXECUTIVE DIRECTOR, SUCHITWA MISSION,**  
**THIRUVANANTHAPURAM**

**PRESENT : K.T. Balabhaskaran**

Sub:- Local Self Government Department - Suchitwa Mission - Revision of Specifications, Standards, Unit Costs, O&M Protocol, etc., for household level/ small unit - Solid Waste Treatment Plants/ Devices to be promoted by Local Self Government Institutions using various type of composting/ Bio methanation techniques - Modified Guidelines issued- Reg.

- Read:-
1. GO(MS)No. 239/2012/LSGD dated 20-09-2012
  2. Proceedings No. 2869/C2/2016/SM dated 02-11-2016 of the Executive Director, Suchitwa Mission.
  3. GO(Rt)No. 2224/2017/LSGD dated 01-07-2017
  4. Proceedings No. 2869/C2/2016/SM dated 02-03-2019 of the Executive Director, Suchitwa Mission.
  5. Proceedings No. 2869/C2/2016/SM dated 09-08-2021 of the Executive Director, Suchitwa Mission.
  6. Minutes of the Technical Committee Meeting held on 29-09-2021 through Video Conference.
  7. Proceedings No. 2869/C2/2016/SM dated 15-09-2021 of the Executive Director, Suchitwa Mission.
  8. Proceedings No. 2869/C2/2016/SM dated 01-12-2021 of the Executive Director, Suchitwa Mission.
  9. Proceedings No. 2869/C2/2016/SM dated 31-03-2022 of the Executive Director, Suchitwa Mission.
  10. Proceedings No. 2869/C2/2016/SM dated 29-04-2022 of the Executive Director, Suchitwa Mission.
  11. Minutes of the Rate Fixation Committee held on 28-06-2022.

No: 2869/C2/2016/SM

Dated: 16.09.2022

Government vide order read as 1st above have approved the modified guidelines, unit cost, specifications, standard, O&M protocols and contract condition for various treatment technologies, at household level/small units for promoting source level treatment of solid waste (biodegradable) in Kerala. Vide paper read as 2nd, 4th, 8th, 9th and 10th above Suchitwa Mission have approved unit cost, specification standard and O&M protocols for new composting devices which are not published in the paper read as 1st above. Vide paper read 3rd above Government have approved unit cost, specification, standard and O&M protocol for new biogas plant (Portable Mixed Culture fed batch biogas plant) which is not published in the paper read as 1st & 2nd above.

Vide paper read as 5th above Rate fixation Committee was constituted to revise the rate of existing solid waste management devices. Vide paper read as 9th above Suchitwa Mission had revised the unit costs of the household level solid waste (biodegradable) management devices. The unit costs approved vide papers read as 7th, 8th and 9th are inclusive of GST and the unit cost approved vide paper read as 10th above is exclusive of GST. In order to standardize the unit rates Technical Committee decided to revise the unit cost of all the devices exclusive of GST. As per the recommendation of the committee vide paper read 11th above, the revised Specifications, unit cost and O&M Protocol for the household level/ small scale unit solid waste management plants/ devices appended as annexure 1 is hereby approved with the following General conditions.

## **General Conditions**

### **1. Details of Unit cost**

- The unit cost approved against the devices are including cost of materials, tools and equipment as per standards, specification, labour, training, conveyance including installation at the household/user location and commissioning the facility.
- All incidental expenditure including cow dung/ inoculum and other expendable items required for completing the unit has to be provided and it is inclusive of the unit cost.
- The agency undertaking the supply shall also train the beneficiary in operation and capacity building of the unit and shall provide user's manual/ guideline.
- The agency should also provide two-year free warranty period from the date of installation of the unit during which they shall repair/replace all defective items at of cost.
- The entire facility shall be designed/ fabricate/ supplied/ installed using appropriate technology for the safe use by the beneficiary.
- **While implementing projects for supply of SWM devices approved by this order, the implementing officers of LSGIs shall ensure provision for GST as per prevailing norms is included in addition to the approved unit cost. Technical sanction for such projects shall also be accorded including necessary prevailing GST provision.**
- The implementing agency shall mandatorily inspect the waste treatment plant/ device established by them within the warranty period (at least 2 years) once in three months and once in a year thereafter, to ensure their functionality and, if necessary, proposal for maintenance/ renovation and operationalization shall be made to the beneficiary/ concerned local self-government institution.

### **2. Mode of implementation**

- The project/ work shall be executed through Government/ Suchitwa Mission approved Service Providers through competitive limited tenders or through Government Accredited Agencies as per laid down procedures approved by

the Government from time to time. In any case, the rates shall not exceed the approved unit costs.

- All Government norms and orders related to acceptance of tenders, execution of agreement, payment of bills and release of security/ performance guarantee shall be strictly followed while implementing the projects.

Encl: Specifications, unit cost and O&M Protocol.

Sd/-

K T Balabhaskaran \*  
Executive Director

Copy To

1. Principal Director LSGD
2. Director LSGD (Urban)
3. Director LSGD (Rural)
4. Commissioner for Rural Development
5. All District Coordinators, Suchitwa Mission
6. Secretaries of all Grama Panchayats & ULBs through District Co-ordinators, Suchitwa Mission.
7. OC/SF/ Website issue

\* This is a computer system (Digital File) generated letter. Hence there is no need for a physical signature.

**Decentralised Waste Management: Specifications, Cost and Operation and Maintenance Protocols of Household Devices/Small units**

**1. Various Composting Units**

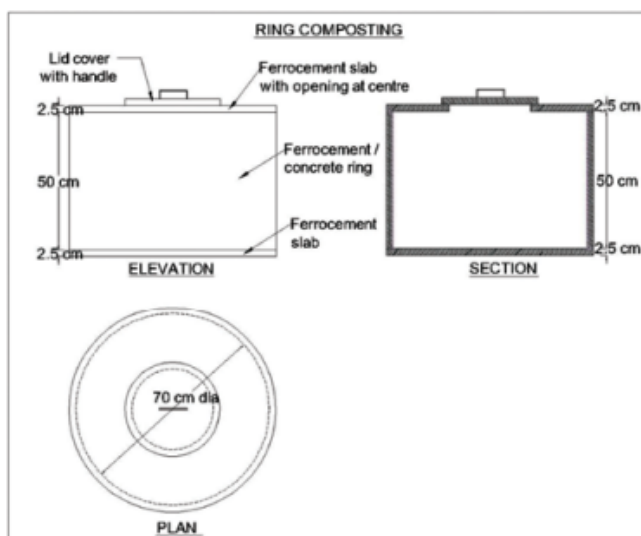
**1.1. Vermi Composting Units (1.5kg/day waste feed)**



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Vermi tank of any one set of the following specifications and sizes</b>		
1.	Two numbers of broad mouth PVC, basin 25 litres capacity each or one PVC basin of 50 litre capacity with a partition at the centre, minimum weight of the combined unit be 2.5kg.	1,500/-
2.	Two numbers of broad mouth fibre basin 25 litres capacity each or one fibre basin of 50 litre capacity with a partition at the centre (minimum thickness of the fibre body 3mm.)	1,750/-
3.	Mud pots (country burnt) two numbers 25 litre capacity each	1,360/-
4.	Terracotta jars with lids two numbers 25 litres capacity each	1,400/-
<b>Infrastructure Requirements common to all units above</b>		
	<ul style="list-style-type: none"> <li>● Base layer with coconut fibre and gravel/sand with cow-dung (-5 kg) powder</li> <li>● Wire-mesh lid covers 200 worms in each tank</li> <li>● Holes at the bottom of the basin/pot/tank to drain leachate/vermi wash</li> <li>● Arrangements for protecting the basin/pot/tank from mice, red ants, etc.</li> <li>● Thick wet cloth or wet sack piece for covering the waste</li> <li>● Surgical hand gloves for handling waste &amp; manure</li> </ul>	

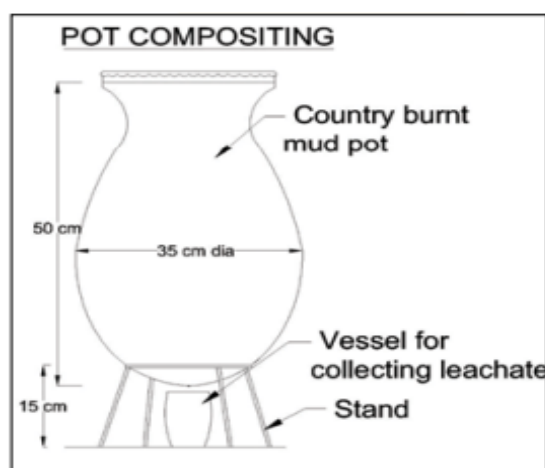
	<ul style="list-style-type: none"> <li>• Vermi wash collection tray is optional</li> </ul>	
<p><b>O &amp; M Protocols common to all units above</b></p>		
	<ul style="list-style-type: none"> <li>• Chop the waste to size less than 5 cm before put into the Basin/pot/tank</li> <li>• Thickness of the waste layer should not exceed 15cm at each feed.</li> <li>• Use one basin/pot/tank for the first 15 days and then use the second basin/pot/tank</li> <li>• Sprinkle cow-dung powder over the waste</li> <li>• Protect the vermi basins/pots/tanks from mouse, ants and other pests</li> <li>• Keep the bin covered with wet sack or cloth piece</li> <li>• Sprinkle water over the cover sack/cloth to maintain a moisture of 50-55%</li> <li>• Avoid over sprinkling of water and stagnation of liquid at the bottom of the basin</li> <li>• Vermi Basin/pot/tank should not be exposed to direct sunlight or rainfall</li> <li>• Prevent introduction of excessive hot, sour and oily substances and also bones, meat &amp; fibre materials</li> <li>• For removing the vermi compost, expose the basin/pot/tank with contents in shaded sunlight for 2-4 hours and remove the compost from the top and use the basin/pot/tank with earthworms for further composting of bio-wastes</li> <li>• Compost taken out should not be dried under sunlight</li> <li>• Renew the base layer annually</li> <li>• Collection of wash out from the basin in the final stages of composting for vermi-wash</li> </ul>	

### 1.2. Ring Compost Unit: (1.5 kg/day waste feed)



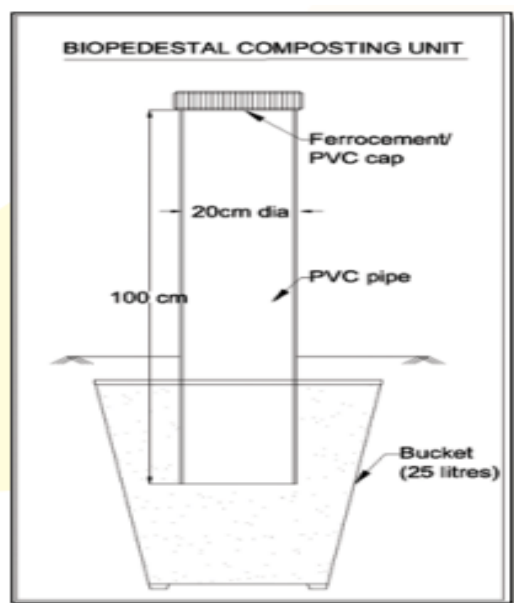
Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Ring Composting Unit with the following specifications and sizes</b>		
	<p>a) Ferro/cement ring of internal diameter 0.7 m, thickness 2.5 cm and height 0.5 m placed over a circular Ferro cement slab of dia 0.75m and thickness 2.5 cm. The ring will have a hole of dia 2.5cm at the bottom for the leachate to flow out.</p> <p>b) Circular Ferro/cement cover slab of 0.75 m diameter and 2.5 cm thick with central circular hole of 0.30 m diameter to cover the ring, a lid which can be removed and refitted back for loading the waste into the ring and closing it tightly after loading the waste.</p>	<b>3,350/-</b>
<b>Infrastructure requirements</b>		
	<ul style="list-style-type: none"> <li>● Two sets of circular Ferro - cement rings resting on circular Ferro - cement slabs and covered by another circular Ferro - cement slab with provision for loading the waste from the top</li> <li>● Base layer with cow-dung (~5 kg) powder</li> <li>● Surgical hand gloves for handling the waste &amp; manure</li> </ul>	
<b>O &amp; M Protocols</b>		
	<ul style="list-style-type: none"> <li>● Chop the waste to size less than 5 cm before placing in the basin</li> <li>● Remove the top central lid of the ring and drop the waste into the ring and spread the waste evenly.</li> <li>● Use one ring for the first 90 days and then use the second ring.</li> <li>● After 175 days, compost from the first ring can be emptied and the same can be used for further waste feeding</li> <li>● Renew the base layer annually</li> </ul>	

### 1.3. Pot Composting Unit



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Pot Composting Unit with the following specifications and sizes</b>		
	<ul style="list-style-type: none"> <li>● Mud pots country burnt about 50cm height and about 35 cm diameter at the centre, with lid - 2 Nos.</li> <li>● Tripod stand of 15 cm height and appropriate design made of wood /plastic/steel or brick pedestals for keeping the pots - 2 Nos .</li> </ul>	<p><b>1300/-</b> As per GO(Rt) No.2298/2021 /LSGD dtd. 17/11/2021</p>
<b>Infrastructure requirements</b>		
	<ul style="list-style-type: none"> <li>● Plastic vessel 10 cm high half litre capacity, for collection of leachate coming out of the pots - 1 no.</li> <li>● Trowel small size -1 No</li> <li>● Painting brush ½ “ size -1 No</li> <li>● One brick cut into two pieces.</li> </ul>	
<b>O &amp; M Protocols</b>		
	<ul style="list-style-type: none"> <li>● Make a small hole on the bottom of the pots carefully without breaking them</li> <li>● Place the pots with lids on the tripods at a convenient place.</li> <li>● Place the ½ litre capacity plastic vessel below one of the pots, selected for filling the waste initially.</li> <li>● Start filling the segregated bio- waste (do not put slow degrading items and non-degradable items into the pots) daily into one pot and keep the pot closed. The waste treatment device is capable of treating 1 to 2 kg of waste per day.</li> <li>● Leachate coming out of the pot gets collected inside the plastic vessel placed below the pot. Put some salt powder into the plastic vessel to avoid the entry of flies. The leachate collected can be diluted with water and used as a manure in the garden</li> <li>● Once the first pot is filled, start using the second one.</li> <li>● Once the second pot becomes full, the waste in the first pot gets converted into compost.</li> <li>● After the first week of commencement a lot of worms will be seen in the pot. Do not try to kill them, they activate the composting process and they die after 3 weeks.</li> <li>● If the quantity of water inside the pot is more, use some sawdust to absorb the water.</li> <li>● If too many flies are seen around the pot, make a solution of ‘camphor’ in coconut oil (Dissolve two Tablets in 25 ml of oil) and apply it on the bottom and top cover of the pot, by means of the brush.</li> <li>● Sprinkling diluted rotten curd /cow-dung solution etc into the waste will speed up the composting process</li> </ul>	

#### 1.4. Bio-pedestal Composting Unit

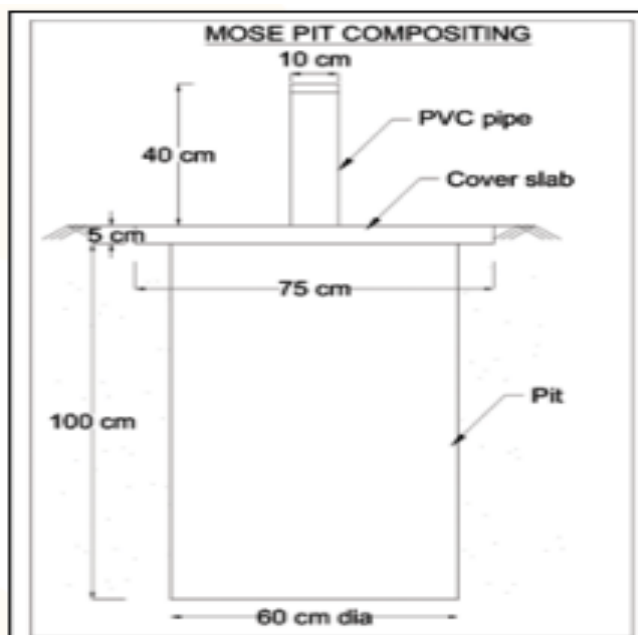


Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Bio-pedestal Composting Unit with the following specifications and size</b>		
	<ul style="list-style-type: none"> <li>● Plastic bucket/vessel with open mouth around 25 litre capacity- 2 Nos.</li> <li>● PVC pipe 2.5kg/cm<sup>2</sup>, ISI marked 200 mm diameter -1.0 m long.-2 Nos.</li> <li>● A plastic/Ferro cement lid for closing the open end of the pipe -2 Nos.</li> </ul>	<b>1,440/-</b>
<b>O &amp; M Protocols common to all units above</b>		
	<ul style="list-style-type: none"> <li>● Take a pit bigger than the size of the plastic bucket/vessel.</li> <li>● Keep the plastic bucket/vessel inside the pit</li> <li>● Fill the plastic bucket/vessel with soil up to half of its height.</li> <li>● Place the pipe vertically into the vessel/bucket above the earth filling</li> <li>● Fill up the bucket/vessel and the pit with soil keeping the pipe portion inside.</li> <li>● Keep the open end of the pipe seen above ground, closed with cover.</li> <li>● Put the bio-waste (easily digesting items only) into the pipe.</li> <li>● Occasional sprinkling of cow-dung solution or approved inoculum into the waste will be good.</li> </ul>	



	<ul style="list-style-type: none"> <li>• The bio-waste gets digested inside the vessel and distributed evenly into the ground.</li> <li>• Plant a tree by the side of the pit which will absorb the manure.</li> <li>• Shift the Bio-pedestal column to a different location after a year or so, if required.</li> </ul>	
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### 1.5. Mose Pit Composting Unit



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Mose pit composting with the following specifications and sizes</b>		
	<ul style="list-style-type: none"> <li>• Pit of size 60cm diameter and depth 1 m for a family of 5 members.</li> <li>• Diameter of the pit may go up to 1.5 metre for institutions.</li> <li>• Restrict the depth to 1metre in all cases as methanogenic activities get reduced at lower depth.</li> <li>• The bottom of the pit is of oval shape.</li> <li>• The cover slab of size 75cm diameter (for a pit of 60 cm diameter) and thickness 7.5cm. PVC pipe of 100 mm dia for domestic type and can be up to 200 mm diameter for bigger size pits.</li> <li>• Cover the pit with the cover slab and spread soil over the slab.</li> <li>• Only the pipe will be visible above the ground. This method is not suitable where strata are loose.</li> </ul>	<b>1,130/-</b>

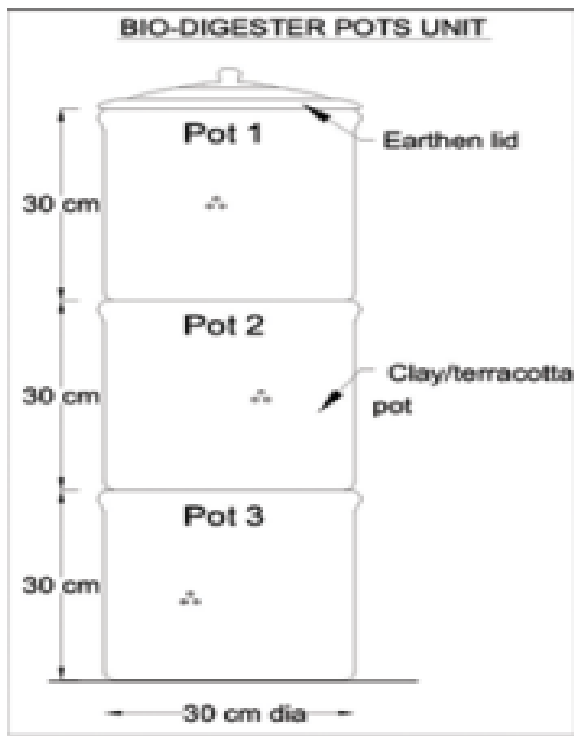
## Infrastructure requirements

- Circular pits of required diameter and depth 1 metre in a convenient location. -2 Nos .
- Circular/rectangular slabs with 8” dia central hole to cover the pit
- A PVC pipe of 8” dia, 50cm long, vertically placed at the centre of the slab - 2 sets
- PVC caps to close the opening of the pipe -2 Nos.

## O & M Protocols

- Ensure the presence of microorganism before putting the waste into the pit by sprinkling cow-dung/ decomposed waste into the pit.
- Drop the shredded bio-waste into the pit through the pipe opening daily and keep the pipe end closed always.
- Sprinkling of warm water of 35<sup>0</sup> to 45<sup>0</sup> C temperature once in a week will accelerate the decomposition process.
- Occasionally pour the cow-dung mixture or any methanogenic seed into the pit.
- Keep using the pits alternately for six months each

### 1.6. Bio-digester Pots Units



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Bio-digester Pot Composting with the following specifications and sizes</b>		
	<ul style="list-style-type: none"> <li>● The pots are locally moulded with clean clay/ terracotta and oven dried, are to be kept vertically one above the other and the pot on the top is covered with a lid.</li> <li>● The pot number 1 and 2 are kept at the top and middle position and are open on the top as well as bottom. The bottom open portion is weaved with plastic wires</li> <li>● Pot number 3 is kept at the bottom and is open at the top and closed at the bottom.</li> </ul>	<b>1,800/-</b>
<b>Infrastructure requirements</b>		
	<ul style="list-style-type: none"> <li>● Clay pots - 3 Nos of appx 30cm diameter and 30cm height each and minimum thickness 12 mm.</li> <li>● Earthen lid for pot -1No</li> <li>● Old news paper</li> <li>● Hand pump(sprayer)</li> <li>● Bio-compost or saw dust (Mango wood, Rubber and Aryaveppu dust are not to be used)</li> <li>● Specially prepared bio-culture.</li> <li>● Steel fork (Small)</li> </ul>	
<b>O &amp; M Protocols</b>		
	<ul style="list-style-type: none"> <li>● Sufficient to treat 2 kg of bio-waste per day.</li> <li>● Place newspaper sheets at the bottom of pot number 1 and 2 over the plastic thread to form a bio-platform.</li> <li>● Spread starter material 1” thick over the bio-platform. (Either already prepared bio-compost or saw dust treated with bio-culture be used as starter material. Mix sawdust with diluted bio-culture (bio-culture: water ratio 1:50) Ensure water used for mixing the bio-culture does not contain chlorine and keep it in a sack bag duly tied. After two days, the sawdust mixture becomes hot inside by the activities of the bacteria. This hot mixture can be used as the starter.)</li> <li>● Spread the shredded waste over the starter layer.</li> <li>● Spray diluted bio-culture mixture over the waste.</li> <li>● Before closing the pot with the lid sprinkle starter Mixture over the waste layer.</li> <li>● Keep spreading the waste daily as above.</li> <li>● Third day onwards stir/mix the old waste layer by using a fork without tearing the paper at the bottom, before placing the fresh waste on the top.</li> </ul>	

	<ul style="list-style-type: none"> <li>• Each time spray bio-culture mixture and then sprinkle starter over it before closing the lid.</li> <li>• Once the top pot is full, shift the middle pot to the top and the top pot to the middle portion and repeat the process of spreading the waste into the new pot on the top in the same way as done earlier.</li> <li>• Once the second pot also becomes full, tear the paper layer on the first pot (now in the middle position) and push the semi-decomposed waste into the bottom pot.</li> <li>• Shift this emptied pot to the top position and the top pot to the middle portion. Continue filling the waste into the top pot as per the same procedure done earlier.</li> <li>• Now all the pots are full and the waste inside the bottom pot must have become compost and ready for use as manure in the garden. Empty it and continue the process as a routine.</li> <li>• Do not use excess water.</li> </ul>	
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### 1.7. Portable house-hold Bio-bin Unit

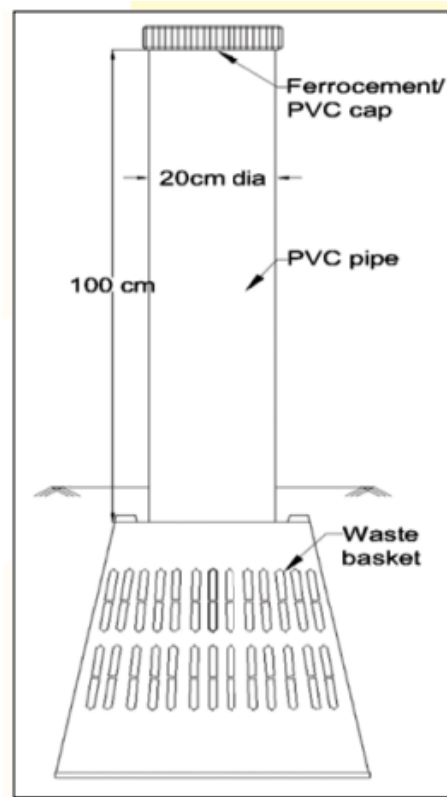


Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Portable house-hold Bio-bin unit composting with the following specifications and sizes</b>		
	<ul style="list-style-type: none"> <li>• Bio-bins are made of 35 ltr. capacity HDPE bucket with adequate no of holes at the top most portion of the bin for proper aeration. Each bio-bin consists of one bottom tray to collect the leachate, the main bin compartment for the waste and the top cover to close the bin.</li> </ul>	<b>2,750/-</b>
<b>Infrastructure requirements</b>		
	<ul style="list-style-type: none"> <li>• Portable bio-bins - 2 Nos.</li> <li>• Cow-dung, black soil, jaggery, yeast, saw-dust or coconut husk</li> </ul>	

## O & M Protocols

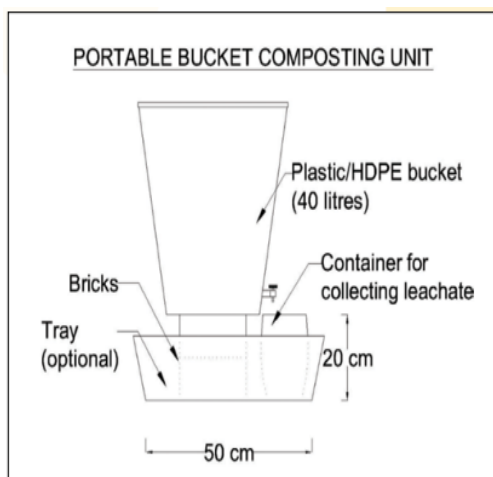
- Cut the segregated biodegradable kitchen waste into pieces and deposit it in one of the bio-bins as a layer.
- Spray specially prepared bio-culture diluted with water in the ratio 1:100 into the waste layer.
- Sprinkle a mix of cow-dung, curd, black soil, jaggery, yeast, saw-dust or coconut husk over it.
- Next day, deposit the waste of that day over the first layer of waste followed by bio culture mixture spray and sprinkling of the mix of cow-dung, jaggery, etc.
- This bin gets filled up within 45 days.
- Close the bin and keep it separately and start filling the second bin in the same way as done in the case of the first one, till it gets filled up.
- After the second bin is filled the waste in the first bin gets converted into compost and is emptied for another cycle. The compost can be used as a manure.

### 1.8. Mini Bio-pedestal Unit



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Mini Bio-pedestal Composting unit with the following specifications and sizes</b>		
	<ul style="list-style-type: none"> <li>● Pit size sufficient to bury a domestic type waste basket -2 Nos.</li> <li>● Household waste basket with perforations - 2 Nos.</li> <li>● PVC pipe 2.5 kg/cm<sup>2</sup> ISI marked 1.0 m long 20cm diameter - 2 Nos.</li> <li>● PVC /Ferro cement cap for 20 cm pipe -2 Nos.</li> <li>● Broken stone 12/20 mm size</li> <li>● Tripod - top circular ring with 30 cm high 3 legs fabricated out of 8mm TMT bar and three 3mm thick flat iron pieces 30x30 mm welded to the ring for fixing of the 200 mm pipe by means of screws-duly painted.</li> </ul>	<b>1,880/-</b>
<b>Infrastructure requirements</b>		
	<ul style="list-style-type: none"> <li>● Pit size sufficient to bury a domestic type waste basket - 2 Nos.</li> <li>● House-hold waste basket with perforations - 2 Nos</li> <li>● PVC pipe 1.0 m long 20 cm diameter - 2 Nos</li> <li>● PVC/Ferro cement cap for 20 cm pipe - 2 Nos.</li> <li>● Broken stone 12/20 mm size - Tripod stand</li> </ul>	
<b>O &amp; M Protocols</b>		
	<ul style="list-style-type: none"> <li>● Cut a hole 20 cm diameter on the bottom of the waste basket</li> <li>● Place the waste basket upside down into the pit</li> <li>● Insert the pipe into the basket by 10 cm, the pipe has to be tightly fitted into the basket (fix the tripod to hold the pipe centrally after filling up the pit).</li> <li>● Fill up the gaps between the basket and the pit sides with broken metal</li> <li>● Close the pit with earth and only the pipe with the lid cover and the tripod will be seen outside.</li> <li>● Two sets of such mini-pedestals for a house-hold is required.</li> <li>● Put the waste into the pipe and keep the open end closed with the lid after dropping the waste.</li> <li>● Use one pedestal for one week and a second pedestal for next week.</li> <li>● Keep using the pedestals alternately.</li> <li>● Taking out the waste may be done only if required.</li> <li>● Grow a plant near the pit.</li> </ul>	

## 1.9. Portable HDPE/Bucket Composting Unit

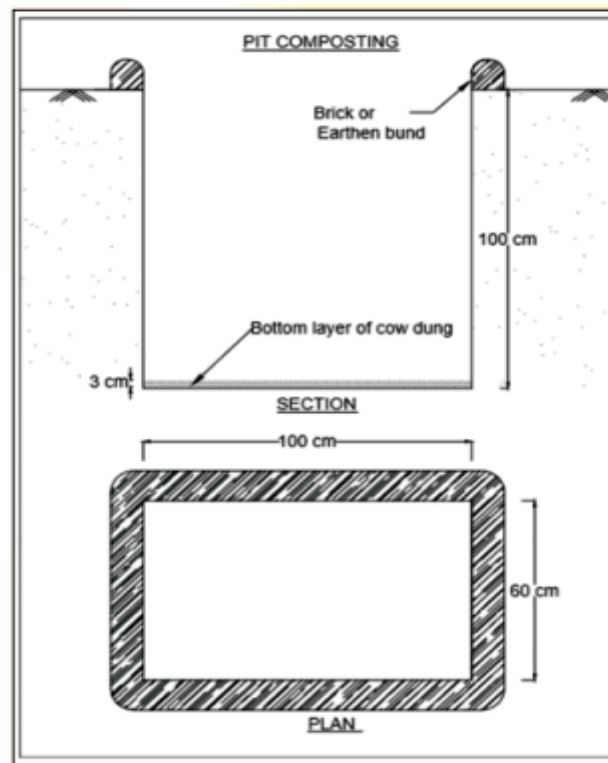


Sl. Sl. No.No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Bucket Composting with the following specifications and sizes</b>		
	<ul style="list-style-type: none"> <li>● Plastic or HDPE buckets/pots 40 litre capacity duly provided with adequate number of holes at top most portion (for aeration) and with a lid and an outlet tap on the side at the bottom most portion (The tap should be removable and fitted by means of a socket/coupling) - 2 Nos.</li> <li>● Coconut shells -sufficient numbers</li> <li>● Bricks 4 Nos for placing the bucket/pot inside the tray.</li> <li>● Small plastic vessel/mug 15 to 20 cm high for collection of leachate.</li> <li>● Plastic net 0.5mx0.5m size</li> <li>● Plastic tray approx. 0.5m diameter to keep the bucket inside (optional)</li> <li>● Wooden spoon</li> </ul>	<b>1,250/-</b>
<b>Infrastructure requirements</b>		
	<ul style="list-style-type: none"> <li>● Plastic or HDPE bucket/pots 40 litre capacity with lid cover duly fitted with a tap outlet on the side at the bottom most point – 2 Nos.</li> <li>● Coconut shells – sufficient numbers</li> <li>● Bricks 4 Nos. for placing the bucket/pot inside the tray</li> <li>● Small plastic vessel/mug 15 to 20 cm high for collection of leachate</li> <li>● Plastic net 0.5m x 0.5m size</li> <li>● Plastic tray approx. 0.5m diameter to keep the bucket inside (optional)</li> <li>● Wooden spoon</li> </ul>	

## O & M Protocols

- Stack a layer of coconut shells in an inverted position at the bottom of the bucket/pot.
- Place the plastic net cut to the shape over the layer of coconut shell.
- Place two sets of bricks inside a plastic tray and keep the prepared bucket/pot above the bricks for convenience of draining the leachate into a plastic vessel to be placed inside the plastic tray just below the tap outlet. Placing the bucket inside the tray is optional.
- Start loading the bio -waste into the bucket/pot on the layer of coconut shells daily .
- Occasionally mix the fresh waste with the old waste by using the wooden spoon. Keep the bucket /pot closed with the lid cover.
- One bucket/pot will become full in 25 to 30 days time in a family of 5 members.
- Close the bucket/pot with lid cover and start using the second set.
- Keep pouring a mug of water into the waste inside the bucket once a week. Drain the leachate as it comes out. The drained leachate can be used as manure in the garden.
- Once the second bucket gets filled, the waste in the first one will be ready as compost. Empty it and reuse the bucket/pot for further storing the waste.

### 1.10. Pit Composting Unit





Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Pit Composting with the following specifications and sizes</b>		
	<ul style="list-style-type: none"> <li>● Pits of adequate size to bury the biodegradable waste of 6 months in each pit</li> <li>● Pits of length 1m and width 60 cm and depth 1m for a family 5 or 6 members.</li> <li>● Bigger size pits for bigger families according to the requirements.</li> <li>● Dig the pits in an elevated place where there is no chance of water logging. If not take adequate precaution to avoid ingress of rain water into the pits like raising a small bund around the pits etc.</li> </ul>	The work to be got done through MGNREGS Scheme
<b>Infrastructure requirements</b>		
	<ul style="list-style-type: none"> <li>● Dug two pits of adequate size</li> <li>● Tarpaulin or PVC roofing sheets to cover the pits</li> <li>● Cow-dung, loose earth for daily cover</li> <li>● Tools like shovel, trenching hoe etc.</li> </ul>	
<b>O &amp; M Protocols</b>		
	<ul style="list-style-type: none"> <li>● Spread a layer of cow-dung slurry or decomposed waste on the bottom of the pit before starting dumping the waste.</li> <li>● Start spreading the waste (only biodegradable) over the cow-dung or decomposed waste layer.</li> <li>● Bigger sizes of the waste is to be cut into small pieces for easy decomposing.</li> <li>● Sprinkle a small earth layer over it daily to avoid bad smells from the pit.</li> <li>● Repeat the procedure daily -spread the waste first, and then the earth layer.</li> <li>● Once the pit is filled up fully, close the pit by spreading a layer of 15 cm of earth .</li> <li>● Once the first pit is closed, keep dumping the waste in the other in the same way.</li> <li>● Once the waste in the first pit becomes compost after a period of 4 to 6 months, clear the pit and make it ready for further use. The compost can be disposed of or used as a manure.</li> <li>● Protect the pit from rainwater, keep it covered by means of tarpaulin or PVC roofing sheet.</li> </ul>	

### 1.11. Pipe Composting Unit



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Pipe Composting with the following specifications and size</b>		
	<ul style="list-style-type: none"> <li>● The PVC pipe of 2.5 kg/cm<sup>2</sup> pressure rating, ISI marked 200 mm size – 1 m long.</li> <li>● Length, diameter and number of pipes are increased based on requirement. Other types of pipes like Ferro cement etc can also be used.</li> <li>● 5mm – 10 mm dia. holes (12-16 nos.) Along the side of the pipe up to 15 cm down from top.</li> </ul>	<b>1,130/-</b>
<b>Infrastructure requirements</b>		
	<ul style="list-style-type: none"> <li>● Pipe pieces of 200 mm diameter, 1.0 metre long each – 2 nos. with 5mm - 10 mm dia. holes (12-16 nos.) along the side of the pipe up to - 15 cms down from top.</li> <li>● Top lid cover made out of Ferro cement/Fibre/GI for 200mm pipes – 2 Nos.</li> <li>● Pit of 200 mm diameter and depth 30 cm.</li> </ul>	
<b>O &amp; M Protocols</b>		
	<ul style="list-style-type: none"> <li>● Erect/fix the pipe vertically inside the pit.</li> <li>● Activate the methanation process by sprinkling a small quantity of fresh cow-dung mix into the pipe.</li> <li>● Cut the segregated bio-waste into small pieces and put it into the pipe.</li> </ul>	

	<ul style="list-style-type: none"> <li>● Do not pour any liquid waste into it.</li> <li>● Keep the pipe closed with the lid cover.</li> <li>● Occasionally sprinkle fresh cow-dung or approved Inoculum into the waste layer to activate the composting process.</li> <li>● Keep the lid always closed.</li> <li>● Once the pipe is filled up to the top, close it and start using the second pipe.</li> <li>● When the second pipe is filled the first be removed from the pit and push the decomposed waste out by inserting a steel/ bamboo rod from the other end.</li> <li>● Decomposed waste has to be dried and used as compost.</li> <li>● This arrangement may be used for a small family of 4 or 5 members.</li> <li>● More number of pipes/bigger diameter pipes for bigger families.</li> </ul>	
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### 1.12. Kitchen Bin - Composting Unit



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Kitchen Bin with the following specification and size.</b>		
	<ul style="list-style-type: none"> <li>● One meshed Plastic or HDPE basket worth Rs. 150 of 15” upper dia, 11” bottom dia, 14” height, 25 ltr. capacity, with a meshed covering lid.</li> <li>● UV protected two plastic sacks worth Rs. 50 of 6-10kg capacity kept inside the basket for dumping the biodegradable waste. Tag for closing the sack is attached at the mouth. One sack can be used up to 3 to 4 times.</li> <li>● 30 litres of microbes enriched inoculum worth Rs.150 for absorbing the water</li> </ul>	<b>440/-</b>

### Infrastructure Requirement

- One meshed plastic or HDPE basket of 25 Ltr. capacity.
- A meshed covering lid for covering the basket.
- Two UV protected aerated plastic sacks for loading the bio waste.
- 30 litres of microbes enriched inoculum for absorbing the water.

### O & M Protocols

- Place the meshed basket in the corner of the kitchen.
- Place the aerated plastic sack inside the basket for putting the waste
- Spread a little Inoculum at the bottom of the basket. Then spread the biodegradable waste over it. (Preferably avoid moisture content)
- Again spread the microbes enriched Inoculum over the waste to avoid smelling and attracting the flies.
- Place the meshed covering lid over the meshed basket.
- Repeat the same procedure at every time of waste filling.
- One sack becomes full in 15-20 days of feeding.
- Once the sack gets filled, close the mouth and remove it from the basket and keep outside.
- Then place the additional sack and repeat the same procedure.
- By the time of filling the second sack the first one will become fully composted.
- The compost can be removed from the sack and dry it under the shade. Then it can be used as manure in the garden.

### 1.13. Bio Composter Bin



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Bio Composter Bin with the following specification and size</b>		
	<ul style="list-style-type: none"> <li>● Three PPCP (Polypropylene Co-polymer) Bins of 2.5-3 mm gauge, 32 cm height, 35 cm upper dia, and 27 cm bottom dia, 22 ltr Capacity with 1- 2 mm dia holes provided all round for ventilation.</li> <li>● The bins contain 3 PPCP lids of 3 mm gauge, 40 cm dia duly having centre hole of 22 cm dia, fit for holding the upper one and covering the bottom bin.</li> <li>● The upper most covering lid should contain a removable hot air ventilation mouth of 2 cm height, 30.5 cm diameter fitted at 31 cm diameter centre hole with a fully ventilated hot air cap with handle.</li> <li>● PPCP tray of 2.5 cm height and 27cm dia provided at the bottom most portion for leachate collection.</li> <li>● One block of microbes enriched Inoculum as a starter kit for water absorption.</li> </ul>	<b>1,930/-</b>
<b>Infrastructure Requirement</b>		
	<ul style="list-style-type: none"> <li>● Three PPCP bins of 22 ltr. Capacity.</li> <li>● Three lids for holding the upper bin duly meant for covering the bottom bin.</li> <li>● One top most lid has a hot air ventilation mouth for ensuring the air circulation.</li> <li>● A leachate collection tray at the bottom of most portions.</li> <li>● One block of microbes enriched Inoculum as a starter kit for water absorption.</li> </ul>	
<b>O &amp; M Protocols</b>		
	<ul style="list-style-type: none"> <li>● Place the three bins over the lid and arrange them into one over another, the top most bin is covered with the lid having a hot air ventilation cap.</li> <li>● Leachate collection tray is placed at the very bottom, it is optional to put a little salt in the tray for avoiding mosquito breeding.</li> <li>● Spread a little soaked Inoculum at the bottom of the top most bin then start loading the bio waste into the bin as a thin layer. Again put the Inoculum over the biodegradable waste, cover the top most bin with hot air ventilated lid. Occasionally mix the fresh waste with the old waste by using a wooden spoon. After this keep the bin closed with the covering lid.</li> <li>● One bucket will become full in 20 to 25 day time in a family of 5 members.</li> <li>● Replace the filled bin with the empty one and place the ventilated lid over it.</li> </ul>	

	<ul style="list-style-type: none"> <li>● Repeat the same procedure for both the bins.</li> <li>● By the time of filling the resting two bins the first one will be fully composted. Then empty the first one and start composting again.</li> <li>● Dry the removed compost under the shade, then it can be used as manure in the garden. The fully composted waste can be used as a starter for the next cycle of composting.</li> <li>● Periodically drain the leachate from the leachate collection tray and the drained leachate can be used as manure in the garden</li> </ul>	
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#### 1.14 GEEBIN - 3 Bin System (2 Kg/day capacity)



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Gee Bin- 3 Bin System with the following specification and size</b>		
	<ul style="list-style-type: none"> <li>● 29 litre capacity PolyPropylene Copolymer (PPCP) bins (2 Nos), each bin have an inner digester and an outer covering bin in cylindrical shape, each with a base ring having the facility to collect leachate and filter plate. The bin has a top lid having aeration facility and an upper ring to hold the top lid for treating 2kg waste per day.</li> <li>● One lid for covering the top most bins is provided.</li> <li>● Each bin has two parts. Inner digester and outer covering bin as protective system which helps to prevent entering of flies and insects into the digester.</li> <li>● Filter plates are fixed at the bottom of the digester for easy drain of leachate. Leachate trays are placed above the base ring.</li> <li>● Base rings are provided for holding the upper bin duly meant for fixing the leachate tray and one upper ring for fixing the lid.</li> </ul>	<b>3,840/-</b>

<b>Infrastructure Requirement</b>	
	<ul style="list-style-type: none"> <li>● Inner digester bin dimensions are, 331 mm dia, 335 mm height, 2.4 mm gauge. It is 29 litre capacity and has 2 mm dia holes all around for ventilation.</li> <li>● Outer bin dimensions are 383 mm dia, 335 mm height, 2.4 mm gauge, 1.5 mm dia holes provided all around for ventilation.</li> <li>● Upper plate has 384mm dia, 51 mm height and 2.75 mm thickness for fixing the lid.</li> <li>● The base rings are having 2.75 mm gauge, 384 mm dia and centre hole of 204 mm dia duly meant for fixing leachate tray and for holding the upper bin.</li> <li>● The bins contain a lid 418 mm dia, 112 mm height, 2.6mm thickness and 2 mm dia holes are provided at 65 mm width all round for ventilation of hot air.</li> <li>● Each inner &amp; outer bins are vertically divided into halves. Inner bin is assembled with 6 nut &amp; bolts, and the outer bin is assembled with 10 nut &amp; bolts.</li> <li>● Filter plates 320 mm Dia, 2.4 mm thickness and the central portion 15mm dia with 3mm dia holes for easy drain of leachate.</li> <li>● Microbes enriched inoculum for water absorption and aeration. (Starter)</li> <li>● Tool (hand fork) for stirring the waste.</li> </ul>
<b>O &amp; M Protocol</b>	
	<ul style="list-style-type: none"> <li>● The inner digester bin is assembled with nuts &amp; bolts.</li> <li>● Fix the filter plate at the bottom of the inner bin by pressing it at the bottom of the inner bin.</li> <li>● Place the base ring and fix the inner bin into it.</li> <li>● Assemble the outer cover with nuts &amp; bolts and place it in the base ring.</li> <li>● Place the bins over the base rings and arrange them as one over another.</li> <li>● Fix the leachate tray at the base ring. It is optional to put some dry coco-peat into the leachate tray for absorbing the excess leachate.</li> <li>● Spread a little soaked inoculum at the bottom of the upper digester bin as a thin layer. Then start loading the bio waste into the upper bin. Again put the inoculum over the bio waste, after every use, cover the upper bin with a lid. Occasionally mix the fresh waste with the old waste.</li> <li>● One bin will be filled within 25 to 30 day time in a family of 5 members.</li> <li>● Replace the filled bin with the empty one and place the lid on it. Repeat the same procedure for each 3 bins.</li> </ul>

	<ul style="list-style-type: none"> <li>● By the time of filling the other two bins the first one will be fully composted/ matured. Empty the first one and start composting again.</li> <li>● Dry the removed compost under shade, then it can be used as a starter for the next cycle of composting</li> <li>● Periodically clean the leachate tray. The collected leachate may be used as inoculum for composting or can be used as manure in the garden.</li> </ul>	
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### 1.15 Gee Bin – 2 Bin System(1.5 Kg/day capacity)



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Gee Bin- 2 Bin System with the following specification and size</b>		
	<ul style="list-style-type: none"> <li>● 29 litre capacity PolyPropylene Co-Polymer (PPCP) bins (2 Nos), each bin have an inner digester and an outer covering bin in cylindrical shape, each with a base ring having the facility to collect leachate and filter plate. The bin has a top lid having aeration facility and an upper ring to hold the top lid for treating 1.5kg waste per day.</li> <li>● One lid for covering the top most bins is provided.</li> <li>● Each bin has two parts. Inner digester and outer covering bin as protective system which helps to prevent entering of flies and insects into the digester.</li> <li>● Filter plates are fixed at the bottom of the digester for easy drain of leachate.</li> <li>● Base rings are provided for holding the upper bin and helps to hold the leachate tray and one top ring for fixing the lid.</li> </ul>	<b>3,270/-</b>



### Infrastructure Requirement

- 2 Nos. of inner digester bin set, diameter - 331 mm dia, 335 mm height, 2.4 mm gauge. It is 29 litre in capacity and has 2 mm dia holes all around for ventilation.
- 2 Nos. of outer bin set, dimensions are 383 mm dia, 335 mm height, 2.4 mm gauge, 1.5 mm dia holes provided all around for ventilation.
- 1 number of to ring is having 384 mm dia, 51 mm height and 2.75 mm thickness for fixing the top lid.
- 2 numbers of base rings are having 2.75 mm gauge and 378.17 mm dia. This base has got the facility to hold approximately 2 to 3 litres of leachate in it and also this ring helps to hold the upper bin.
- The bins contain a lid 418 mm dia, 112 mm height, 2.6mm thickness and 2 mm dia holes are provided at 65 mm width all round for ventilation of hot air.
- Each inner & outer bins are vertically divided into halves. Inner bin is assembled with 6 plug buttons, and the outer bin is assembled with 10 plug buttons.
- Filter plates 320 mm Dia, 2.4 mm thickness and the central portion 15mm dia with 3mm dia holes for easy drain of leachate.
- Microbes enriched coco peat (inoculum) for speedy composting, water absorption and aeration. (Starter)

### O & M Protocol

- The inner digester bin is assembled with plug buttons
- Fix the filter plate at the bottom of the inner bin by pressing it at the bottom of the inner bin.
- Place the base ring and fix the inner bin into it.
- Assemble the outer cover with nuts & bolts and place it in the base ring.
- Place the bins over the base rings and arrange them as one over another. It is optional to put some dry coco-peat into the base ring for absorbing the excess leachate.
- Spread a little soaked inoculum at the bottom of the upper digester bin as a thin layer. Then start loading the bio waste into the upper bin. Again put the inoculum over the bio waste, after every use, cover the upper bin with a top lid. Occasionally mix the fresh waste with the old waste.
- One bin will be filled within 30 to 35 day time in a family of 3 members.
- Replace the filled bin with the empty one and place the lid on it.
- By the time of filling the other two bins the first one will be fully composted/matured. Empty the first one and start composting again.
- Dry the removed compost under shade, then it can be used as a starter for the next cycle of composting
- Periodically clean the leachate tray. The collected leachate may be used as inoculum for composting or can be used as manure in the garden.

### 1.16 V composter (1.5 Kg/day capacity)



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>V composter with the following specification and size</b>		
	<ul style="list-style-type: none"> <li>● Two numbers of ventilated HDPE bins of 60 litre capacity with HDPE lid for covering the composter bins are provided for treating 1.5 kg/day waste.</li> <li>● Holes all around its circumference and its bottom are provided for ensuring proper air circulation inside the bins.</li> <li>● To strain liquid particles from waste so as to avoid the presence of excess moisture content inside the compost bins, a PVC filter plate is provided.</li> <li>● HDPE trays for leachate collection are placed outside the box to collect the leachate generated from the composter.</li> <li>● Microbes enriched inoculum developed by Kerala Agriculture University and 1 sack of coir pitch for water absorption and better waste digestion is provided.</li> <li>● The whole system is enclosed in a box made of GI frame of size 77.5x52x76 cm, covered with 0.35 mm thick GI metal sheet with covering lid of size 82x56 cm, covered with 0.6 mm thick GI metal sheet for protecting the composter from the nuisance of rats and to provide a good appearance.</li> </ul>	<b>4,600/-</b>
	<b>Infrastructure Requirement</b>	
	<ul style="list-style-type: none"> <li>● Two nos. of HDPE bins of 60 litre capacity with HDPE lid.</li> <li>● The bins contain 2 mm dia holes all round its circumference and its bottom.</li> <li>● A Filter made of PVC to strain liquid particles from waste.</li> <li>● Two nos. of HDPE trays for leachate collection.</li> </ul>	

	<ul style="list-style-type: none"> <li>● 1 Kg of Microbes enriched inoculum developed by Kerala Agriculture University and 1 sack of coir pith.</li> <li>● A box made of GI frame of size 77.5x52x76 cm, covered with 0.35 mm thick GI metal sheet with covering lid of size 82x56 cm, covered with 0.6 mm thick GI metal sheet</li> </ul>	
<b>O &amp; M Protocol</b>		
	<ul style="list-style-type: none"> <li>● Spread a little microbes enriched inoculum in the bins as a thin layer and close the bins with the covering lid.</li> <li>● Place the two bins inside the GI box and close the box lid.</li> <li>● Strain the bio waste with a filter to avoid the presence of excess moisture content inside the composter bins.</li> <li>● Spread the bio waste inside the bin and again put a little inoculum over the biodegradable waste, cover the bin with lid.</li> <li>● Leachate collection tray is placed outside the box; it is optional to put a little salt in the tray for avoiding mosquito breeding.</li> <li>● Occasionally mix the fresh waste with the old waste. After this keep the bin closed with the covering lid.</li> <li>● One bucket will become filled within 45 days' time in a family of 5 members. Leave it for composting and the second bin is taken into use for another 45 days.</li> <li>● Repeat the same procedure for both the bins.</li> <li>● By the time of filling the second bin the first one will be fully composted. Then empty the first one and start composting again.</li> <li>● Dry the removed compost under the shade. It can be used as manure in the garden.</li> <li>● The fully composted waste can be used as a starter for the next cycle of composting.</li> <li>● Periodically drain the leachate from the leachate collection tray. The diluted leachate can also be used as manure in the garden.</li> </ul>	

### 1.17 Smart bio bin (2 Kg/day capacity)



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Smart bio bin with the following specification and size</b>		
	<ul style="list-style-type: none"> <li>● Hollow cylinder with outer ring made of Stainless steel coin mesh with supporting legs and a platform (for holding the biomass inside the cylinder) and inner ring made of GI weld mesh is proposed for treating 2kg waste per day.</li> <li>● A plastic tray and spatula is provided for collecting the compost.</li> <li>● The hollow cylinder is covered with perforated ACP sheet as lid with locking arrangements.</li> </ul>	<b>2,190/-</b>
<b>Infrastructure Requirement</b>		
	<ul style="list-style-type: none"> <li>● Hollow cylinder with 50.80 cm (20 inches) dia outer ring made of Stainless steel coin mesh and 45.72 cm(18 inches) dia inner ring made of 1 1/4 X 1 1/4 inches 14 gauge GI weld mesh with a height of 114.30 cm (3 3/4 feet). 3 no.s of 114.30 cm(3 3/4 feet) long supporting legs made of GI square pipe with plastic bush, welded inside the hollow cylinder.</li> <li>● A platform made of 1 1/4 X 1 1/4 inches 8 gauge GI weld mesh fixed 15.24 cm (1/2 feet) height from the bottom.</li> <li>● Plastic tray of size 48.26 cm (19 inches) dia paced in a stand below the cylinder.</li> <li>● GI made spatula.</li> <li>● Lid made of 51cm dia perforated ACP sheet with locking arrangements.</li> </ul>	
<b>O &amp; M Protocol</b>		
	<ul style="list-style-type: none"> <li>● Crushed dry leaves or paper are spread in the bottom of the inner shell of smart Bio bin, so that it will facilitate easy drain of compost into the bottom tray.</li> <li>● Coconut husk or dry leaves are filled in the outer shell of the smart bio bin, to absorb leachate or liquid particles from the waste.</li> <li>● The daily bio waste and dry leaves is spread over the crushed leaves in sandwich model</li> <li>● A single smart bio bin will fill up within 45 days' time. During this time the bottom most waste will become compost.</li> <li>● The spatula attached at the very bottom is turned for easy drain of compost.</li> <li>● Waste can be fed continuously into the bin, since compost is obtained from the bottom portion.</li> </ul>	

## 1.18 Bokashi Bucket (1.5kg/day capacity)

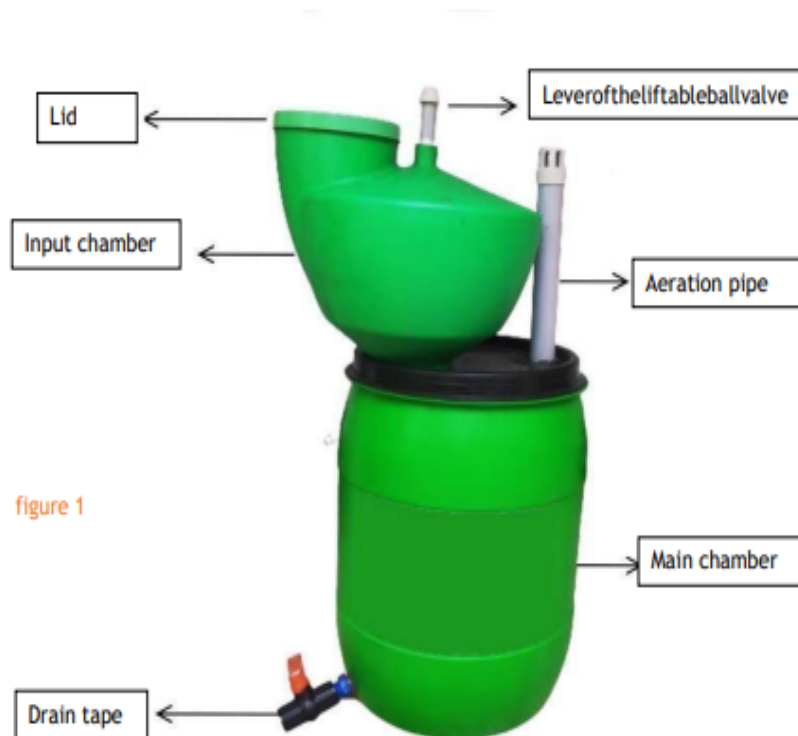


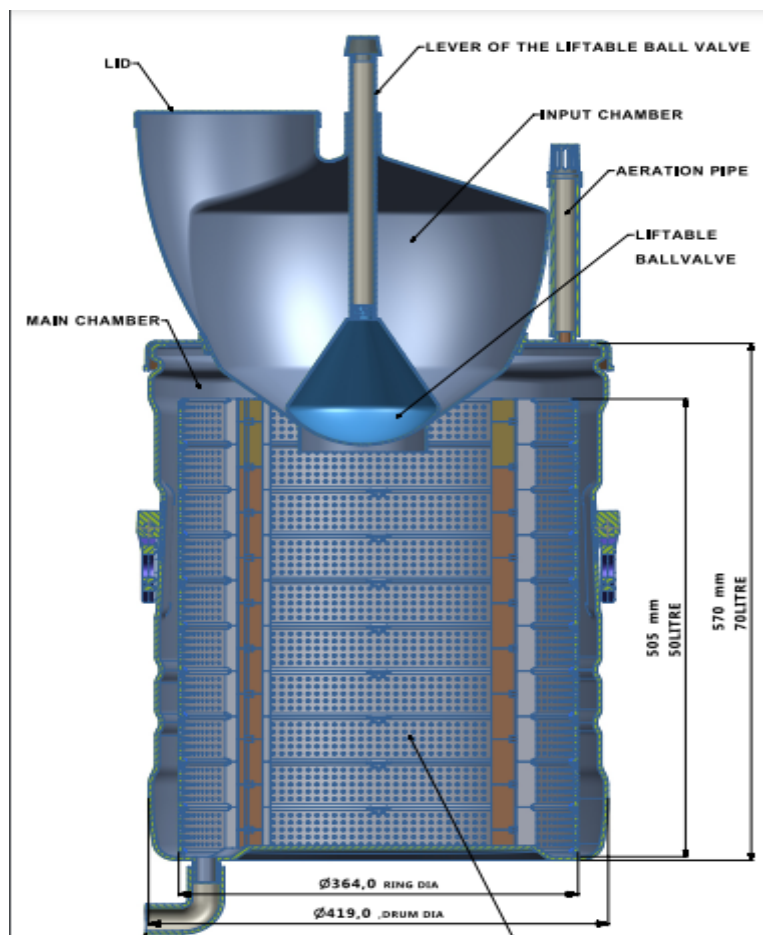
Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Bokashi Bucket with the following specification and size</b>		
	<ul style="list-style-type: none"> <li>● Two numbers of 30 litre capacity PPCP bucket for treating 1.5 kg/day waste with PPCP lid having bottom slender portion meant for leachate collection and top wider portion meant for waste digestion.</li> <li>● A tap at the bottom for removing the leachate collected.</li> <li>● A Filter made of PVC to strain liquid particles from waste to avoid presence of excess moisture content inside the compost bins.</li> <li>● An ABS Filter placed above the leachate collection partition for straining the leachate from digested waste.</li> <li>● A small piece of jaggery inserted at the bottom most portions to eliminate the odour in the leachate collected.</li> <li>● 1 kg of approved inoculum as a starter for composting.</li> <li>● A 2 weeks anaerobic fermentation period is recommended.</li> <li>● After a 15 days anaerobic fermentation process a pickled acidic pre-composter product is obtained.</li> </ul>	<b>2,540/-</b>
<b>Infrastructure Requirement</b>		
	<ul style="list-style-type: none"> <li>● Two nos. of PPCP bins of 30 litre capacity with HDPE lid.</li> <li>● A tap at the bottom for removing the leachate collected</li> <li>● A Filter made of PVC to strain liquid particles from waste.</li> <li>● An ABS Filter</li> <li>● A small piece of jaggery to eliminate the odour in the leachate collected.</li> <li>● 1 Kg of Microbes enriched inoculum</li> </ul>	

## O & M Protocol

- Spread a little microbe's enriched inoculum and a small piece of jaggery at the bottom most, leachate collection portion.
- Place the ABS filter inside the bin.
- Strain the bio waste with a strainer to avoid the presence of excess moisture content inside the compost bins.
- Spread the bio waste inside the bin and again put a little inoculum over the biodegradable waste, cover the bin with lid.
- Occasionally mix the fresh waste with the old waste. After every use keep the lid closed.
- One bucket will become filled within 30 days' time in a family of 4 members. Leave it for composting and the second bin is taken into use for another 30 days.
- After filling the first bin, take the second bin into action. Repeat the same procedure for both the bins.
- By the time of filling the second bin the first one will be fully composted. Then empty the first one and start composting again.
- The partially digested compost, removed from the bin, shall be buried in the soil or may be taken into a centralised composting facility.
- Periodically drain the leachate collected. The diluted leachate can also be used as manure in the garden.

### 1.19 Vermion Kitchen Waste Treatment Unit





Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Vermion Kitchen Waste Treatment Unit with the following Specification and size</b>		
	<ul style="list-style-type: none"> <li>● Vermion Waste treatment unit is capable of composting/digesting 4-5 Kgs of Biodegradable waste per day.</li> <li>● Vermion waste treatment unit contains a double chambered Barrel (70 Ltr outer main chamber &amp; 50 Ltr inner net chamber) made of HD Plastic, supported by an input chamber with 15cm diameter HDPE lid and a lift-able ball valve system inside the input chamber.</li> <li>● A complete Unit of vermion consists of 2 Nos of Double chambered Barrels, 2 Nos of drain collection can, and one number of input chamber.</li> <li>● The main chamber is fitted with an aeration pipe system (PVC), so as to drain all the vermin fluids into the plastic can.</li> <li>● The approx total weight of a Domestic Vermion Unit with all the above mentioned parts is about 10Kgs</li> <li>● A cow during based dry inoculum powder is used to promote waste degradation if needed.</li> </ul>	<b>4,400/-</b>

### Infrastructure Requirement

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|--|--|
| <ul style="list-style-type: none"> <li>● Outer Main Chamber : 2 Nos</li> <li>● Inner Net Chamber : 2 Nos</li> <li>● Input Chamber with lid &amp;</li> <li>● Lift able ball valve system : 1 No.</li> <li>● Aeration pipe system (1metre Length) : 2 Nos</li> <li>● Drain Tap : 2 Nos</li> <li>● Drain Collection Cam (PVC) : 2 Nos</li> <li>● Inoculum : 10 Kgs</li> </ul> |  |
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### O & M Protocol

- Put all the biodegradable kitchen waste 4 – 5 Kg/ day into the input chamber
- On lifting the ball valve the waste will be deposited into the inner net chamber from where it will start to digest/compost with the help of “*Black Soldier*” Larvae
- The digested /semi digested fluid part will continue to drain from the inner chamber to the main chamber and finally be collected to the can.
- The digestion process is continuous until or up to 2-3 months while the inner chamber is almost filled.
- Then, use the additional chamber for waste feeding, by shifting the input chamber from the first chamber to the additional chamber supplied, then only the feed in the first chamber is fully digested.
- After completion of further two months all the compost manure is collected and used for agriculture purposes etc.
- The vermin drain can be collected frequently from the can and used as fertiliser, diluting it with water at the ratio 1 :5
- The cow dung based inoculum is sprinkled/added into the chamber to speed up the digestion process or to promote proper functioning of the entire system as and when needed

### 1.20 Kitchen Waste Digester (2kg/day capacity)





Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Kitchen Waste Digester with the following Specification and size</b>		
	<ul style="list-style-type: none"> <li>● Two number of Ultraviolet stabilised LLDPE bins of 120 litre capacity with stable octagon shape</li> <li>● Two airtight lids are provided in each bin, one to dump waste &amp; the other to collect manure/compost.</li> <li>● Top side is provided with a ventilation hole which is filtered by a stainless steel screen to avoid flies. Behind the ventilation hole, there is an activated carbon impregnated foam to avoid bad odour at the initial stage of digestion process before microbes start working.</li> <li>● At the centre of each bin there is a thin hollow pipe half the way, vertically, this pipe passes the leachate to the soil from the middle portion of the bin.</li> <li>● At the bottom of each bin there are 5 drain holes of 2 inch diameter to drain leachate into soil beneath.</li> <li>● Microbes enriched inoculums of 2kg are provided.</li> </ul>	<b>5,600/-</b>
<b>Infrastructure Requirement</b>		
	<ul style="list-style-type: none"> <li>● Required soil ground of 60cms width &amp; 120 cm length to install two digester bins.</li> <li>● Two numbers of LLDPE bins of 120 litres each with lids</li> <li>● Bins are of octagonal shape narrowing with top vertically, bottom diameter of 55cms and upper diameter of 30cms overall height of each bin is 83cms.</li> <li>● Each bins have thickness of 5mm of Ultraviolet stabilised LLDPE material</li> <li>● Lid with diameter of 15cms, both for dumping waste &amp; for manure collection</li> <li>● Centre of each bin contains a hollow pipe of 5cms diameter &amp; 40 cms height.</li> <li>● 3 ventilation holes of diameter 2cms, are provided the top rear side.</li> <li>● Activated carbon impregnated foam of 5cms x 5cms x 2.5cms are fixed at the top behind the ventilation holes.</li> <li>● 3cms x 8cms size stainless steel mesh protects the ventilation hole from files.</li> </ul>	
<b>O &amp; M Protocol</b>		
	<ul style="list-style-type: none"> <li>● Select a suitable space 60cms, width &amp; 120cms length to install 2 digester bins.</li> <li>● Install the bottom side of two bins 5cm, deep into the soil, where soil beneath has a normal waste absorption rate.</li> </ul>	

	<ul style="list-style-type: none"> <li>● Use one digester bin at a time, waste input must not exceed 2kg per day.</li> <li>● Open the top lid and input any kind of organic solid food waste into the first bin.</li> <li>● Add 30gms of provided microbial inoculums into the bin once in a day.</li> <li>● One bin of 120 litre will become filled within 6 months since 80% of solid waste is converted into liquid and then drained into soil beneath.</li> <li>● Leave the first bin for another 6 months when it gets filled without inputting waste, by this time the second bin will become filled.</li> <li>● Now open the side lid of the first bin to collect organic manure or compost.</li> <li>● After collecting all the compost now the first bin is ready to use again.</li> <li>● The collected compost is ready to use in gardens or plants.</li> </ul>	
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### 1.21 Organic Composting Bin



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Organic Composting Bin with the following Specification and size</b>		
	<ul style="list-style-type: none"> <li>● Bins – Dia 39.69 x 35.2 cm Thickness upto 4 mm. weight 825gm Bottom dia – 27.94 cm, Capacity 23.5 Litre , Height 32.2 cm.</li> <li>● Lid – size – 31.7 x 31.7 x 3.9 cm. 2 mm ventilation holes. Thickness upto 4mm. Weight 175 gm.</li> </ul>	<b>2,125/-</b>

	<ul style="list-style-type: none"> <li>● Brace (Ring), Size 43.6 x 43.6 x 3.75 cm . Inner hole dia – 22.2mm. Thickness upto 4mm, Weight – 330gm.</li> <li>● Standard –Size 43.6 x 43.6 x 3.75cm</li> <li>● Inner holes dia – 22.2mm. Thickness upto 4mm. Weight – 330gm</li> <li>● Leg – dia 2.4 x 6.37cm, thickness – 2.8 mm</li> <li>● 5kg Kerala Agriculture University inoculums as starter hit.</li> <li>● Tray – Size 23.15 x 3.1 cm. thickness 1.5mm, Weight 56gm. Capacity 700ml.</li> </ul>	
<b>Infrastructure Requirement</b>		
	<ul style="list-style-type: none"> <li>● 3 PPC Bins with bottom nostle</li> <li>● 3 PPC Braces (Rings)</li> <li>● 3 PPC perforated pipes</li> <li>● 1 PPC Stand</li> <li>● 1 PPC Lid</li> <li>● 5kg saw dust inoculums</li> </ul>	
<b>O &amp; M Protocol</b>		
	<ul style="list-style-type: none"> <li>● First of all, a stand is placed. After connecting the shaft in the bin, the same placed over the stand and the bin the brace is over the bin placed</li> <li>● The second and third bins are arranged in the similar way. Every time nostell of the bin must be connected with the shaft.</li> <li>● The top most brace is covered by a lid.</li> <li>● The cap of the top bin is always set on the top of the shaft</li> <li>● The tray is always kept under the stand</li> <li>● Initially Kitchen waste is loaded in the first bin as small pieces and thin layers.</li> <li>● Later the inoculums required is sprinkled over it.</li> <li>● This is continued until the first bin gets filled.</li> <li>● The device should be stirred well every time before applying Kitchen waste. When the first bin gets filled, It is removed and placed at the bottom.</li> <li>● The same procedure is repeated in the second and third bin. When the third bin is filled, composting might have automatically completed in the first bin and the compost can be taken out.</li> <li>● The dried compost can be used as a manure and starter to the next level of composting.</li> <li>● Leachate must be removed periodically and the tray must be placed back.</li> <li>● A single bin will get filled completely in 15 to 20 days. A family of 5 members will generate nearly 1.5 to 2kg kitchen waste daily and the same can be deposited in the device.</li> </ul>	

	<ul style="list-style-type: none"> <li>• The leachate removed periodically can be diluted by adding water and can be used for watering plants in the ratio 1:20 for sensitive plants and 1:10 for other plants.</li> <li>• Moisture level in the device must be mentioned as 40-60% by using inoculums.</li> <li>• Waste should not be added in the device along with the waste and usage of any material which is harmful to the bacteria should be prevented.</li> </ul>	
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## 2. Portable Biogas Units

### 2.1 Portable (Prefabricated) biogas unit - 0.5m<sup>3</sup> capacity (Digester with gas holder of any one of the following specifications)



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Specification of digester and gas holder</b>		
(i)	Unit without water jacket: PVC/LLDPE/HDPE Tanks with circular shape as digester and floating gas holder with total volume 0.50m <sup>3</sup> and thickness of 3mm to 4 mm.	<b>10,290/-</b>
(ii)	Unit without water jacket : FRP Tanks with circular shape as digester and floating gas holder with total volume 0.50m <sup>3</sup> and thickness of 3mm to 4 mm	<b>10,930/-</b>
(iii)	Unit with water jacket : PVC/LLDPE/HDPE tanks as per (i) above with water jacket in between the digester and the gas holder	<b>11,570/-</b>
(iv)	Unit with water jacket : FRP tanks as per (ii) above but with water jacket in between the digester and the gas holder	<b>13,500/-</b>

<b>Infrastructure requirements</b>		
	<ul style="list-style-type: none"> <li>● Treatment capacity – 2.5 kg of solid waste per day</li> <li>● Digester with gas holder of any one of the specifications listed above</li> <li>● Inlet device with pipe of diameter 110 mm</li> <li>● Inlet chamber with a plastic/FRP mug having circular shape and with a lid.</li> <li>● Outlet device with pipe of 63mm diameter</li> <li>● A plastic can of 10 litre capacity to be used for collecting slurry/effluent for safe disposal.</li> <li>● If toilet waste is also treated in a biogas plant, slurry from the biogas plant to be treated in a septic tank soak pit arrangement.</li> <li>● Rubber hose of 25 mm diameter for conveyance of biogas for use with a maximum length of 10 m</li> <li>● Stove with single burner</li> <li>● Control valve for regulating gas</li> <li>● Mosquito net also to be provided over the water jacket.</li> <li>● Plant to be established in a place fully exposed to sunlight and away from drinking water sources.</li> </ul>	
<b>O &amp; M Protocols</b>		
	<ul style="list-style-type: none"> <li>● Start up by adding 25 kg cow dung with equal quantity of water</li> <li>● Waste feeding after chopping and mixed with water or part of waste water in the ratio of 1:1</li> <li>● Daily feeding of easily degradable waste in slurry form or solid waste mixed with equal quantity of water. Rice water, other waste water used for washing of rice, vegetables or meat in the kitchen shall be used instead of water.</li> <li>● Limit the maximum quantity of daily feeding of waste to 2.5 kg/day. A plastic can to be used for collecting slurry/effluent in case of portable units for safe disposal. If toilet waste is also treated in a biogas plant, slurry from the biogas plant to be treated in a septic tank soak pit arrangement.</li> <li>● Clean the inlet chamber after each feed and keep it closed</li> <li>● Prohibited to feed wastes of slow degrading nature like straw, soil, egg shells, fibrous materials like banana leaves, coconut shells, coconut coir, pseudo stem etc. Feeding of toxic substances like fungicides, insecticides, pesticides, detergents, and disinfectants like phenyl, dettol etc. are also prohibited.</li> <li>● Mix the substrate or rotate the drum at least weekly for preventing scum formation</li> </ul>	

<b>Standards</b>		
	<ul style="list-style-type: none"> <li>• Minimum waste retention time of 40 days</li> <li>• All PVC pipe of class 4 kg/cm<sup>2</sup></li> <li>• Rubber hose stove and control valve with ISI mark</li> <li>• Particle size of waste not to exceed 20 mm</li> </ul>	

**2.2. Portable (Prefabricated) biogas unit - 0.75 m<sup>3</sup> capacity  
(Digester with gas holder of any one of the following specifications)**

<b>Sl. No.</b>	<b>Specification and Size</b>	<b>Approved Unit Rate (in Rs.)</b>
<b>Specification and Size</b>		
(i)	Unit without water jacket : PVC/LLDP//HDPE Tanks with circular shape as digester and floating gas holder with total volume 0.75m <sup>3</sup> , thickness of 3mm to 4 mm	<b>12,860/-</b>
(ii)	Unit without water jacket : FRP Tanks with circular shape as digester and floating gas holder with total volume 0.75m <sup>3</sup> , thickness of 3mm to 4 mm	<b>13,500/-</b>
(iii)	Unit with water jacket : PVC/LLDP/HDPE tanks as per (i) above with water jacket in between the digester and the gas holder, thickness of 3 mm to 4 mm	<b>14,140/-</b>
(iv)	Unit with water jacket : FRP tanks as per (ii) above with water jacket in between the digester and the gas holder thickness of 3mm to 4 mm	<b>15,430/-</b>
<b>Infrastructure requirements</b>		
	<ul style="list-style-type: none"> <li>• Treatment capacity – 5 kg of solid waste per day</li> <li>• Digester with gas holder of any one of the specifications listed above.</li> <li>• Inlet device with pipe of diameter 110 mm</li> <li>• Inlet chamber plastic/FRP having circular shape and with a lid.</li> <li>• Outlet device with pipe of 63mm diameter.</li> <li>• A plastic can of 10 litre capacity shall be used for collecting slurry/effluent for safe disposal. (If toilet waste is also treated in a biogas plant, slurry from the biogas plant to be treated in a septic tank soak pit arrangement.)</li> <li>• Rubber hose of 25 mm (¾ inch) diameter for conveyance of biogas for use with maximum length of 10 m</li> <li>• Stove with single burner</li> <li>• Control valve for regulating gas</li> </ul>	

	<ul style="list-style-type: none"> <li>● Mosquito net also to be provided over the water jacket.</li> </ul> <p>* Plant to be established in a place fully exposed to sunlight and away from drinking water source</p>	
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### O & M Protocols

	<ul style="list-style-type: none"> <li>● Start up by adding 25 to 50 kg of cow dung with equal quantity of water</li> <li>● Waste feeding after chopping and mixed with water or part of waste water in the ratio of 1:1</li> <li>● Daily feeding of easily degradable waste in slurry form or solid waste mixed with equal quantity of water. Rice water, other waste water used for washing of rice, vegetables or meat in the kitchen shall be used instead of water.</li> <li>● Limit the maximum quantity of daily feeding of waste to 5 kg/day. A plastic can to be used for collecting slurry/effluent in case of portable units for safe disposal. If toilet waste is also treated in a biogas plant, slurry from the biogas plant to be treated in a septic tank soak pit arrangement.</li> <li>● Clean the inlet chamber after each feed and keep it closed</li> <li>● It is prohibited to feed waste of slow degrading nature like straw, soil, egg shells, fibrous materials like banana leaves, coconut shells, coconut coir, pseudo stem etc. Feeding of toxic substances like fungicides, insecticides, pesticides, detergents, and disinfectants like phenyl, dettol etc. are also prohibited.</li> <li>● Mix the substrate or rotate the drum at least weekly for preventing scum formation</li> </ul>	
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### Standards

	<ul style="list-style-type: none"> <li>● Minimum waste retention time of 40 days</li> <li>● All PVC pipe of class 4kg/cm<sup>2</sup></li> <li>● Rubber hose stove and control valve with ISI mark</li> <li>● Particle size of waste not to exceed 20 mm</li> </ul>	
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### 2.3. Portable (Prefabricated) biogas unit - 1.00 m<sup>3</sup> capacity (Digester with gas holder of any one of the following specifications)

Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Specification and Size</b>		
(i)	Unit without water jacket : PVC/LLDP/HDPE Tanks with (ii) Circular shape as digester and floating gas holder with (iii) Total volume 1m <sup>3</sup> thickness of 3mm to 4 mm	15,430/-

(ii)	Unit without water jacket : FRP Tanks with circular shape as digester and floating gas holder with total volume 1m <sup>3</sup> thickness of 3 mm to 4 mm	16,070/-
(iii)	Unit with water jacket : PVC/LLDP/HDPE tanks as per (i) above but with water jacket in between the digester and the gas holder thickness of 3mm to 4 mm	16,710/-
(iv)	Unit with water jacket : FRP tanks as per (ii) above but with water jacket in between the digester and the gas holder thickness of 3mm to 4 mm	17,360/-

### Infrastructure requirements

	<ul style="list-style-type: none"> <li>● Treatment capacity – 7.5 kg solid waste per day</li> <li>● Digester with gas holder of any one of the specifications listed above.</li> <li>● Inlet device with pipe of diameter 110 mm</li> <li>● Inlet chamber container, having circular shape of 30 cm diameter and with a lid.</li> <li>● Outlet device with pipe of 63mm diameter</li> <li>● A plastic can of 10 litre capacity to be used for collecting slurry/effluent for safe disposal. (If toilet waste is also treated in a biogas plant, slurry from the biogas plant to be treated in a septic tank soak pit arrangement.)</li> <li>● Rubber hose of 25 mm (¾ inch) diameter for conveyance of biogas for use with a maximum length of 10 m</li> <li>● Stove with single burner</li> <li>● Control valve for regulating gas</li> <li>● Mosquito net also to be provided over the water jacket.</li> </ul> <p>* Plant to be established in a place fully exposed to sunlight and away from drinking water sources.</p>	
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### O & M Protocols

	<ul style="list-style-type: none"> <li>● Start up by adding 50 kg of cow dung with equal quantity of water</li> <li>● Waste feeding after chopping and mixed with water or part of waste water in the ratio of 1:1</li> <li>● Daily feeding of easily degradable waste in slurry form or solid waste mixed with equal quantity of water. Rice water, other waste water used for washing of rice, vegetables or meat in the kitchen can be used instead of water.</li> <li>● Limit the maximum quantity of daily feeding of waste to 7.5 kg/day. A plastic can shall be used for collecting slurry/effluent in case of portable units for safe disposal. If toilet waste is also treated in a biogas plant, slurry from the biogas plant to be treated in a septic tank soak pit arrangement.</li> <li>● Clean the inlet chamber after each feed and keep it closed</li> </ul>	
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	<ul style="list-style-type: none"> <li>● It is prohibited to feed wastes of slow degrading nature like straw, soil, egg shells, fibrous materials like banana leaves, coconut shells, coconut coir, pseudo stem etc. Feeding of toxic substances like fungicides, insecticides, pesticides, detergents, and disinfectants like phenyl, dettol etc. are also prohibited.</li> <li>● Mix the substrate or rotate the drum at least weekly for preventing scum formation</li> </ul>	
<b>Standards</b>		
	<ul style="list-style-type: none"> <li>● Minimum waste retention time of 40 days</li> <li>● All PVC pipe of class 4kg/cm<sup>2</sup></li> <li>● Rubber hose stove and control valve with ISI mark</li> <li>● Particle size of waste no to exceed 20 mm</li> </ul>	

**2.4. Portable (Prefabricated) Biogas Plant 0.5 m<sup>3</sup> Capacity  
(Mixed Culture Fed-Batch type with separate digester and gas holder)**



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Specification of the unit</b>		
	Unit with separate digester & wall mounted gas holder: HDPE Tank with cylindrical shape as digester and wall mounted flexible cuboid gas holder as per the specifications below <ul style="list-style-type: none"> <li>● An IS 12701 standard 300 Litre capacity HDPE tank with a top cover.</li> </ul>	<b>8,000/-</b>

	<ul style="list-style-type: none"> <li>● One ISO/TR 14933:2012 &amp; 43.040.80 Standard Catalogue Cuboid Gas holder having size 100mm x 120mm with a 410 ltr @ 2 fill/ 24 hrs capacity PVC Liner &amp; PP Outer shade, anchored in the walls with a 6 mm steel anchoring bolt with 2 x 120 mm steel rods hanger not exceeding 6 mm dia.</li> <li>● An 84 mm HDPE 3 Face Baffle connected to the digestion tank with bleeder-cap facility ( as safety precaution)</li> <li>● One 1.5 metre length rubber based excess pressure relief Digester Lock (as safety precaution)</li> <li>● One 74 mm HDPE Female Thread Adaptor</li> <li>● 210 mm PVC made extra large Feeding Funnel for easy feeding of bio waste into the digester</li> <li>● A 20mm HDPE Gas Vent, connecting gas hose to the digester.</li> <li>● An 8 mm HDPE made Bleeder Plug (as safety precaution)</li> <li>● A 14 mm dia special gas hose of 10 metre length is used for collecting the gas from digester to the gas holder.</li> <li>● A HDPE 8 mm size Safety Pressure Relief Valve Embedded on the top of the digester, as a safety precaution.</li> <li>● An IS-8 standard gas Burner made of refractory brick with a 4 mm centre hole and trenched duly fitted with a 6 inch thick galvanised steel pan top as per fire &amp; safety standards.</li> <li>● 3 units of 14 mm HDPE/ PVC Gas Cock for regulating the biogas.</li> <li>● 2.5 Kg concrete weight is hung on the gas holder with a 5 mm steel weight hook in order to increase the pressure inside the gas holder.</li> <li>● A user's manual is printed or affixed on the gas holder.</li> </ul>	
<b>Infrastructure Requirements</b>		
	<ul style="list-style-type: none"> <li>● Treatment capacity – 2.5 Kg of solid waste per day</li> <li>● Digester with gas holder, stove and other components as per the specifications listed above</li> </ul>	
<b>O &amp; M Protocol</b>		
	<ul style="list-style-type: none"> <li>● Start up by feeding 25 kg cow- dung diluted with equal quantities of water into the digestion tank.</li> <li>● Chopped bio waste is fed into the digester. Add equal quantity of water.</li> <li>● Daily feeding of any biodegradable waste [degradable within 45 days] with equal quantity of water through the top lid or through the top inlet valve as per convenience.</li> <li>● Slurry to be decanted daily by opening the side outlet valve.</li> </ul>	

<b>Standards</b>		
	<ul style="list-style-type: none"> <li>● Minimum waste retention time of 30 days</li> <li>● All core components viz., Digester, gas holder, Stove must satisfy the standards as per detailed specification or oblige as per ISI/ISO classifications.</li> <li>● All accessories viz., gas hose, connectors and control valves to oblige F&amp;S/ISI Standards</li> <li>● Particle size of waste not to exceed 50 mm.</li> <li>● Standard adhesives viz., Araldite, Anabond 666T, M-Seal etc., to be used as required.</li> </ul>	

**2.5 Portable (Prefabricated) Biogas Plant 0.75 m<sup>3</sup> Capacity  
(Mixed Culture Fed-Batch type with separate digester and gas holder)**

<b>Sl. No.</b>	<b>Specification and Size</b>	<b>Approved Unit Rate (in Rs.)</b>
<b>Specification of the unit</b>		
	<p>Unit with separate digester &amp; wall mounted gas holder: HDPE Tank with cylindrical shape as digester and wall mounted flexible cuboid gas holder with total volume 0.75 m<sup>3</sup> as per the specifications below</p> <ul style="list-style-type: none"> <li>● An IS 12701 standard 500 Litre capacity HDPE tank with a top cover.</li> <li>● One ISO/TR 14933:2012 &amp; 43.040.80 Standard Catalogue Cuboid Gas holder having size 100mm x 120mm with a 410 ltr @ 2 fill/ 24 hrs capacity PVC Liner &amp; PP Outer shade, anchored in the walls with a 6 mm steel anchoring bolt with 2 x 120 mm steel rods hanger not exceeding 6 mm dia.</li> <li>● An 84 mm HDPE 3 Face Baffle connected to the digestion tank with bleeder-cap facility ( as safety precaution)</li> <li>● One 1.5 metre length rubber based excess pressure relief Digester Lock (as safety precaution)</li> <li>● One 74 mm HDPE Female Thread Adaptor</li> <li>● 210 mm PVC made Extra Large feeding Funnel for easy feeding of bio waste into the digester</li> <li>● A 20mm HDPE Gas Vent, connecting gas hose to the digester.</li> <li>● An 8 mm HDPE made Bleeder Plug ( as safety precaution)</li> <li>● A 14 mm dia special gas hose of 10 metre length is used for collecting the gas from the digester to the gas holder.</li> <li>● A HDPE 8 mm size Safety Pressure Relief Valve Embedded on the top of the digester, as a safety precaution.</li> </ul>	<b>9,140/-</b>

	<ul style="list-style-type: none"> <li>● An IS-8 standard gas Burner made of refractory brick with a 4 mm centre hole and trenched duly fitted with a 6 inch thick galvanised steel pan top as per fire &amp; safety standards.</li> <li>● 3 units of 14 mm HDPE/ PVC Gas Cock for regulating the biogas.</li> <li>● 2.5 Kg concrete weight is hung on the gas holder with a 5 mm steel weight hook in order to increase the pressure inside the gas holder.</li> <li>● A user's manual is printed or affixed on the gas holder.</li> </ul>	
<b>Infrastructure Requirements</b>		
	<ul style="list-style-type: none"> <li>● Treatment capacity – 5 Kg of solid waste per day</li> <li>● Digester with Gasholder, stove and other components as per the specifications listed above</li> </ul>	
<b>O &amp; M Protocol</b>		
	<ul style="list-style-type: none"> <li>● Start up by feeding 25-50 kg cow- dung diluted with equal quantity of water in to the digestion tank</li> <li>● Chopped bio waste is fed into the digester. Add equal quantity of water.</li> <li>● Daily feeding of any biodegradable waste [degradable within 45 days] with equal quantity of water through the top lid or through the top inlet valve as per convenience.</li> <li>● Slurry to be decanted daily by opening the side outlet valve.</li> </ul>	
<b>Standards</b>		
	<ul style="list-style-type: none"> <li>● Minimum waste retention time of 30 days</li> <li>● All core components viz., Digester, Gasholder, Stove must satisfy the standards as per detailed specification or oblige as per ISI/ISO classifications</li> <li>● All accessories viz., Gas hose, connectors and control valves to oblige F&amp;S/ISI Standards</li> <li>● Particle size of waste not to exceed 50 mm</li> <li>● Standard adhesives viz., Araldite, Anabond 666T, M-Seal etc., to be used as required.</li> </ul>	

**2.6. Portable (Prefabricated) Biogas Plant 1.00 m<sup>3</sup> Capacity  
(Mixed Culture Fed-Batch type with separate digester and gas holder)**

Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Specification of the unit</b>		
	<p>Unit with separate digester &amp; wall mounted gas holder: HDPE Tank with cylindrical shape as digester and wall mounted flexible cuboid gas holder with total volume 1.00 m<sup>3</sup> as per the specifications below</p> <ul style="list-style-type: none"> <li>● An IS 12701 standard 750 Litre capacity HDPE tank with a top cover.</li> <li>● One ISO/TR 14933:2012 &amp; 43.040.80 Standard Catalogue Cuboid Gas holder having size 100mm x 120mm with a 410 ltr @ 2 fill/ 24 hrs capacity PVC Liner &amp; PP Outer shade, anchored in the walls with a 6 mm steel anchoring bolt with 2 x 120 mm steel rods hanger not exceeding 6 mm dia.</li> <li>● An 84 mm HDPE 3 Face Baffle connected to the digestion tank with bleeder-cap facility ( as safety precaution)</li> <li>● One 1.5 metre length rubber based excess pressure relief Digester Lock (as safety precaution)</li> <li>- One 74 mm HDPE Female Thread Adaptor</li> <li>● 210 mm PVC made Extra Large feeding Funnel for easy feeding of bio waste into the digester</li> <li>● A 20mm HDPE Gas Vent, connecting gas hose to the digester.</li> <li>● An 8 mm HDPE made Bleeder Plug (as safety precaution)</li> <li>● A 14 mm dia special gas hose of 10 metre length is used for collecting the gas from the digester to the gas holder.</li> <li>● A HDPE 8 mm size Safety Pressure Relief Valve Embedded on the top of the digester, as a safety precaution.</li> <li>● An IS-8 standard gas Burner made of refractory brick with a 4 mm centre hole and trenched duly fitted with a 6 inch thick galvanised steel pan top as per fire &amp; safety standards.</li> <li>● 3 units of 14 mm HDPE/ PVC Gas Cock for regulating the biogas.</li> <li>● A 2.5 Kg concrete weight is hung on the gas holder with a 5 mm steel weight hook in order to increase the pressure inside the gas holder.</li> <li>● A user's manual is printed or affixed on the gas holder.</li> </ul>	<b>10,290/-</b>
<b>Infrastructure Requirements</b>		
	<ul style="list-style-type: none"> <li>● Treatment capacity – 7.5 Kg of solid waste per day</li> <li>● Digester with gas holder, stove and other components as per the specifications listed above</li> </ul>	

## O & M Protocol

- Start up by feeding 50 kg cow- dung diluted with equal quantity of water in to the digestion tank
- Chopped bio waste is fed into the digester. Add equal quantity of water.
- Daily feeding of any biodegradable waste [degradable within 45 days] with equal quantity of water through the top lid or through the top inlet valve as per convenience.
- Slurry to be decanted daily by opening the side outlet valve.

## Standards

- Minimum waste retention time of 30 days
- All core components viz., Digester, gas holder, Stove must satisfy the standards as per detailed specification or oblige as per ISI/ISO classifications
- All accessories viz., Gas hose, connectors and control valves to oblige F&S/ISI Standards
- Particle size of waste not to exceed 50 mm
- Standard adhesives viz., Araldite, Anabond 666T, M-Seal etc., to be used as required

### 2.7. Mosquito Free Biogas plant (0.75 m<sup>3</sup> or 5 Ltr/day capacity)



Sl. No.	Specification and Size	Approved Unit Rate (in Rs.)
<b>Mosquito Free Biogas plant with the following specification and size</b>		
	<ul style="list-style-type: none"> <li>● 500 litre capacity, 4mm thick FRP made Digester.</li> <li>● 300 litre capacity Gas holder made of 2 mm thick Geomembrane sheets inserted inside, the 30 cm depth water column for water sealing. An overlapping wing of the gas holder is fixed outside the digester for better air sealing.</li> <li>● 5 litre capacity PVC made inlet tank with lid.</li> <li>● 3 inch diameter, 6kg/cm<sup>2</sup>, 70 cm height PVC inlet pipe fixed 30 above from bottom of digester.</li> <li>● 4 inch diameter, FRP moulded 40 cm height S curved outlet pipe fixed 40 cm below the digester top edge.</li> <li>● Supporting frame made of 2mm GI tube, complete with all nuts and bolts for supporting the gas holder balloon.</li> <li>● 5Kg cement concrete block as counter weight to be placed over the gas holder to generate good gas pressure.</li> <li>● The 5 litre capacity FRP made a round shaped weight cap.</li> <li>● 5 M length gas connection rubber hose with inbuilt safety valve.</li> <li>● 1 No. of 12 cft Stainless steel single burner gas stove.</li> </ul>	<b>23,430/-</b>
<b>Infrastructure Requirement</b>		
	<ul style="list-style-type: none"> <li>● Treatment capacity - 5 litre of waste per day.</li> <li>● Digester - 500 litre capacity, 4 mm thick FRP made.</li> <li>● Gas holder - 300 litre capacity, made of 2 mm thick Geomembrane sheets inserted inside, the 30 cm depth water column. An overlapping wing of the gas holder is fixed outside the digester.</li> <li>● Inlet tank with lid - 5 litre capacity PVC made.</li> <li>● Inlet pipe - 3 inch diameter, 6kg/cm<sup>2</sup>, 70 cm height PVC pipe, fixed 30 above from bottom of digester.</li> <li>● Outlet pipe - 4 inch diameter, FRP moulded 40 cm height, S curved structure, fixed 40 cm below the digester top edge.</li> <li>● Supporting frame - made of 2mm GI tube, complete with all nuts and bolts.</li> <li>● Counter weight - 5Kg cement concrete block as.</li> <li>● Weight cap - 5 litre capacity FRP made round shaped.</li> <li>● Gas tube - 5 M length gas connection rubber hose with inbuilt safety valve.</li> <li>● Gas stove - 1 No. of 12 cft Stainless steel single burner gas stove.</li> </ul>	

<b>O &amp; M Protocol</b>		
	<ul style="list-style-type: none"> <li>● Adding 50 kg of cow dung with equal quantity of water charged in the digester for fermentation for 2 weeks' time.</li> <li>● Mix chopped solid waste with water in ratio of 1:1</li> <li>● Limit the maximum quantity of daily feeding of waste to 5 ltr/day.</li> <li>● The gas connector is fixed to the stove.</li> <li>● Hot water or curd is introduced as a digestion accelerator.</li> <li>● Empty the overflow slurry/ effluent using a can/ plastic bucket by opening the outlet pipe cap. (If toilet waste is also treated in a biogas plant, slurry from the biogas plant to be treated in a septic tank soak pit arrangement.)</li> <li>● Clean the inlet chamber after each feed and keep it closed.</li> <li>● Do not feed waste of slow degrading nature like egg shells, fibrous materials like banana leaves, coconut shells, coir pith, pseudo stem etc. and toxic substances like fungicides, insecticides, pesticides, detergents and disinfectants like phenyl, Dettol, floor cleaning lotions etc.</li> </ul>	

## 2.8. Mosquito Free Biogas plant (1.50 m<sup>3</sup> or 10 ltr/day capacity)

<b>Sl. No.</b>	<b>Specification and Size</b>	<b>Approved Unit Rate (in Rs.)</b>
<b>Mosquito Free Biogas plant - with the following specification and size.</b>		
	<ul style="list-style-type: none"> <li>● 1000 litre capacity, 4mm thick FRP made Digester.</li> <li>● 700 litre capacity Gas holder made of 2 mm thick Geomembrane sheets inserted inside, the 30 cm depth water column for water sealing. An overlapping wing of the gas holder is fixed outside the digester for better air sealing.</li> <li>● 5 litre capacity PVC made inlet tank with lid.</li> <li>● 3 inch diameter, 6kg/cm<sup>2</sup>, 70 cm height PVC inlet pipe fixed 30 above from bottom of digester.</li> <li>● 4 inch diameter, FRP moulded 40 cm height S curved outlet pipe fixed 40 cm below the digester top edge.</li> <li>● Supporting frame made of 2mm GI tube, complete with all nuts and bolts for supporting the gas holder balloon.</li> <li>● 5Kg cement concrete block as counter weight to be placed over the gas holder to generate good gas pressure.</li> <li>● The 5 litre capacity FRP made a round shaped weight cap.</li> <li>● 5 M length gas connection rubber hose with inbuilt safety valve</li> <li>● 1 No. of 12 cft Stainless steel single burner gas stove.</li> </ul>	<b>29,900/-</b>



## Infrastructure Requirement

- Treatment capacity - 10 litre of waste per day.
- Digester - 1000 litre capacity, 4mm thick FRP made
- Gas holder - 700 litre capacity, made of 2 mm thick Geomembrane sheets inserted inside, the 30 cm depth water column for water sealing. An overlapping wing of the gas holder is fixed outside the digester for better air sealing.
- Inlet tank with lid - 5 litre capacity PVC made.
- Inlet pipe - 3 inch diameter, 6kg/cm<sup>2</sup>, 70 cm height PVC pipe, fixed 30 above from bottom of digester.
- Outlet pipe - 4 inch diameter, FRP moulded 40 cm height; S curved structure fixed 40 cm below the digester's top edge.
- Supporting frame - 2 mm GI tube, complete with all nuts and bolts for supporting the gas holder balloon.
- Counter weight - 5Kg cement concrete block.
- Weight cap - 5 litre capacity, FRP made round shaped.
- Gas tube - 5 M length rubber hose with inbuilt safety valve.
- Gas stove - 1 No. of 12 cft Stainless steel with single burner gas stove.

## O & M Protocol

- Adding 100 kg of cow dung with equal quantity of water charged in the digester for fermentation for 2 weeks' time.
- Mix chopped solid waste with water in ratio of 1:1
- Limit the maximum quantity of daily feeding of waste to 10 litre/day.
- The gas connector is fixed to the stove.
- Hot water or curd is introduced as a digestion accelerator.
- Empty the overflow slurry/ effluent using a can/ plastic bucket by opening the outlet pipe cap. (If toilet waste is also treated in a biogas plant, slurry from the biogas plant to be treated in a septic tank soak pit arrangement.)
- Clean the inlet chamber after each feed and keep it closed.
- Do not feed waste of slow degrading nature like egg shells, fibrous materials like banana leaves, coconut shells, coir pith, pseudo stem etc. and toxic substances like fungicides, insecticides, pesticides, detergents and disinfectants like phenyl, Dettol, floor cleaning lotions etc