

**Proceedings of the Executive Director, Suchitwa Mission, Thiruvananthapuram
(Present: Sri. Mir Mohammed Ali IAS)**

Sub :- L.S.G.D -Suchitwa Mission- Approval of new solid waste management devices and inoculum – Adopted for processing of Solid Waste –Reg.

- Read :-
1. G.O (M.S) No. 73/2011/LSGD dated 01-03-2011.
 2. G.O (Rt) No. 718/2012/LSGD dated 09-03-2012.
 3. G.O (M.S) No. 239/2012/LSGD dated 20-09-2012.
 4. Proceedings No. 2640/C2/2015/SM dated 27-10-2015 of the Executive Director, Suchitwa Mission.
 5. Minutes of the Technical Committee Meeting held on 05.05.2018 at Suchitwa Mission.
 6. Minutes of the Technical Committee Meeting held on 07.03.2020 at Suchitwa Mission.

Order No.2503/C2/2018/SM

Date:13.04.2021

As per Orders, read 1st, 2nd & 3rd above, Government have notified guideline for specification, Operation & Maintenance protocol, unit cost and contract conditions for the technologies adopted for Solid Waste Management.

A few new Devices and products for supporting Solid Waste Management, which are not published in the papers read 1st, 2nd & 3rd above, were introduced by various proponents for Suchitwa Mission approval. As per paper read 4th above, a Technical Committee was constituted for scrutinizing and approving the technologies and devices for Solid Waste Management. The new devices and products were verified and recommended by the technical committee constituted by Suchitwa Mission as per paper read 5th & 6th above.

Suchitwa Mission is hereby approving seven new source level solid waste management devices with modifications to the existing composting and bio-methanation plants and a coir pith based inoculum as follows. Detailed Specification and O&M protocol for each device is attached in annexure. The new devices and details of agencies who have put forward the new solid waste management devices and inoculum for composting are as following,

Sl No	Name of waste management device	Name of the Agency	Remarks
1.	V composter 1.5 Kg/day capacity (Household/ Institutional Level Composting unit)	V – Care Shopping, Kripa, Valiya Vilapuram, Ottasshekharamangalam Trivandrum – 695125 Ph: 9916354389, 9544098935 subeesh@gmail.com	
2.	Smart bio bin 2 Kg/day capacity (Household/ Institutional Level Composting unit)	Chief Co-ordinator, Laloor Model Project for Solid Waste Management (LAMPS), Instructional Farms, P.O. KAU, Vellanikkara. 9497365443 lampsatkau@gmail.com	
3.	Gee Bin 2 Kg/day capacity (Household/ Institutional Level Composting unit)	Foabs Solution Pvt. Ltd. Startups Valley Tbi, Amal Jyothi College Of Engineering, Koovapally, Kanjirapally, Kottayam Phone: 91 4812953999, 919497333999 foabsolutions@gmail.com	
4.	Bokashi Bucket 1.5 Kg/day capacity (Household/ Institutional Level Composting unit)	Global Pharmaceuticals Thavakkara Complex, Thavakkara, Kannur – 670012 Phone: 0497-2766255, 9446094255 globalwatersys@gmail.com	Approved on pilot basis for a period of 6 months from the date of this order. (Final approval will be given subjected to evaluation of test results of Compost and leachate.)
5.	Solwearth organic waste converter machines (Institutional/ Community Level Composting unit)	Solwearth Ecotech Pvt.Ltd. 54/2969, Temple road, Elamkulam, Kadavanthra, Cochin 682020 Ph: 0484 4052103 info@solwearth.com	
6.	Mosquito Free Biogas plant 0.75 m ³ or 5 Kg/day capacity (Institutional Level BGP)	Biotech, Post Box No.520, MP Appan Road, Vazhuthacad, Thycaud P.O., Thiruvananthapuram 0471-2321909, 2332179. 9447792179, 9446000965 mailtobiotech@gmail.com	
7.	Mosquito Free Biogas plant 1.50 m ³ or 10 Kg/day capacity (Institutional Level BGP)		

8.	Coir pith inoculum	Coirfed The Kerala State Cooperative Coir Marketing Federation Ltd. No. 679, PB No. 4616, Alappuzha - 688012 04772243627 coirfedho@gmail.com	Approved for a period of 1 year from the date of this order. Continuation of approval will be subjected to evaluation of test reports of compost produced using the inoculum.
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Encl: Guidelines and Specifications



Executive Director

- Copy to:-
1. Director of Urban Affairs
 2. Director of Panchayat
 3. All District Co-ordinators, Suchitwa Mission
 4. Secretaries of all Grama Panchayats & ULBs through District Co-ordinator, Suchitwa Mission.
 5. OC/SF/ Website

I. V composter – composting unit (1.5 Kg/day capacity)

V composter with the following specification and size

- Two numbers of ventilated HDPE bins of 60 liter capacity with HDPE lid for covering the composter bins are provided for treating 1.5 kg/day waste.
- Holes all around its circumference and its bottom is provided for ensuring proper air circulation inside the bins.
- To strain liquid particles from waste so as to avoid presence of excess moisture content inside the composter bins, a PVC filter plate is provided.
- HDPE trays for leachate collection placed outside the box to collect the leachate generated from the composter.
- Microbes enriched inoculum developed by Kerala Agriculture University and 1 sack of coir pith for water absorption and better waste digestion is provided.
- 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.

Infrastructure Requirement

- Two nos. of HDPE bins of 60 liter capacity with HDPE lid.
- The bins contain 2 mm dia holes all round its circumference and it's bottom.
- A Filter made of PVC to strain liquid particles from waste.
- Two nos. of HDPE trays for leachate collection.
- 1 Kg of Microbes enriched inoculum developed by Kerala Agriculture University and 1 sack of coir pith.
- 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

O & M Protocol

- Spread a little microbes enriched inoculum in the bins as a thin layer and close the bins with the covering lid.
- Place the two bins inside the GI box and close the box lid.

- Strain the bio waste with filter to avoid presence of excess moisture content inside the composter bins.
- Spread the bio waste inside the bin and again put a little inoculum over the bio-degradable waste, cover the bin with lid.
- Leachate collection tray is placed outside the box; it is optional to put a little salt in the tray for avoiding mosquito breeding.
- Occasionally mix the fresh waste with the old waste. After this keep the bin closed with the covering lid.
- One bucket will become filled within 45 days' time in a family of 5 members. Left it for composting and the second bin is taken into use for another 45 days.
- 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.
- Dry the removed compost under the shade. It can be used as manure in garden.
- The fully composted waste can be used as a starter for the next cycle of composting.
- Periodically drain the leachate from leachate collection tray. The diluted leachate can also be used as manure in garden.

II. Smart bio bin – composting unit (2 Kg/day capacity)

Smart bio bin with the following specification and size

- Hollow cylinder with outer ring made of Stainless steel coin mesh with supporting legs and a platform (for holding the bio mass inside the cylinder) and inner ring made of GI weld mesh is proposed for treating 2kg waste per day.
- A plastic tray and spatula is provided for collecting the compost.
- The hollow cylinder is covered with perforated ACP sheet as lid with locking arrangements.

Infrastructure Requirement

- 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 leg made of GI square pipe with plastic bush, welded inside the hollow cylinder.
- 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.
- Plastic tray of size 48.26 cm (19 inches) dia paced in a stand below the cylinder.
- GI made spatula.
- Lid made of 51cm dia perforated ACP sheet with locking arrangements.

O & M Protocol

- Crushed dry leaves or paper is spread in the bottom of inner shell of smart Biobin, so that it will facilitate easy drain of compost into the bottom tray.
- 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.
- The daily bio waste and dry leaves is spread over the crushed leaves in sandwich model
- A single smart bio bin will filled up within 45 days' time. During this time the bottom most waste will become compost.
- The spatula attached at the very bottom is turned for easy drain of compost.
- Waste can be fed continuously into the bin, since compost is obtained from the bottom portion.

III. Gee Bin – composting unit (2 Kg/day capacity)

Gee Bin with the following specification and size

- Poly Propylene Co-Polymer (PPCP) made 29 liter capacity bins (3 Nos), each with a base ring, upper plate and filter plate and leachate tray is used for treating 2 kg waste per day.
- One lid for covering the top most bins is provided.
- 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.
- Filter plates are fixed at the bottom of digester for easy drain of leachate. Leachate trays are placed above the base ring.
- Base rings are provided for holding the upper bin duly meant for fixing the leachate tray and one upper ring for fixing the lid.

Infrastructure Requirement

- Inner digester bin dimensions are, 331 mm dia, 335 mm height, 2.4 mm gauge. It is 29 liter capacity and having 2 mm dia holes all around for ventilation.
- Outer bin dimensions are 383 mm dia, 335 mm height, 2.4 mm gauge, 1.5 mm dia holes provided all around for ventilation.
- Upper plate is having 384mm dia, 51 mm height and 2.75 mm thickness for fixing the lid.
- The base rings are having 2.75 mm gauge, 384 mm dia and center hole of 204 mm dia duly meant for fixing leachate tray and for holding the upper bin.
- The leachate trays are having 204 mm dia, 23 mm height 1.35mm thickness fixed in the base ring.
- The bins contains 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 nut & bolts, and outer bin is assembled with 10 nut & bolts.
- 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 inoculum for water absorption and aeration. (Starter)

O & M Protocol

- The inner digester bin is assembled with nut & bolts.
- 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 nut & bolts and place it in the base ring.
- Place the bins over the base rings and arrange them as one over another.
- 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.
- Spread a little soaked inoculum at the bottom of 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 lid. Occasionally mix the fresh waste with the old waste.
- One bin will be filled with in 25 to 30 day time in a family of 5 members.
- Replace the filled bin with the empty one and place the lid on it. Repeat the same procedure for each 3 bins.
- 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.

IV. Bokashi Biobin – composting unit(1.5 Kg/day capacity)

Bokashi Biobin with the following specification and size

- Two numbers of 30 liter 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.
- A tap at the bottom for removing the leachate collected.
- A Filter made of PVC to strain liquid particles from waste to avoid presence of excess moisture content inside the composter bins.
- An ABS Filter placed above the leachate collection partition for straining the leachate from digested waste.
- A small piece of jaggery inserted at the bottom most portions for to eliminating the odour in the leachate collected.
- 1 kg of approved inoculum as a starter for composting.
- 2 weeks anaerobic fermentation period is recommended.
- After 15 days anaerobic fermentation process a pickled acidic pre composter product is obtained.

Infrastructure Requirement

- Two nos. of PPCP bins of 30 liter capacity with HDPE lid.
- A tap at the bottom for removing the leachate collected
- A Filter made of PVC to strain liquid particles from waste.
- An ABS Filter
- A small piece of jaggery for to eliminating the odour in the leachate collected.
- 1 Kg of Microbes enriched inoculum

O & M Protocol

- Spread a little microbes 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 strainer to avoid presence of excess moisture content inside the composter bins.

- Spread the bio waste inside the bin and again put a little inoculum over the bio-degradable 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. Left 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 burry in the soil or may take into a centralized composting facility.
- Periodically drain the leachate collected. The diluted leachate can also be used as manure in garden.

V. Solwearth Organic Waste Converter

Solwearth Organic Waste Converter - with the following specification and size

1. SE-2501 (200 Kg/batch)

Machine Dimension (l x b x h)	: 1475 x 1190 x 1170
Tank Dimension (radius x length)	: 725 x 900
Tank Capacity (Liters)	: 255
Power consumption (KW)	: 6

2. SE-3501 (350 Kg/batch)

Machine Dimension (l x b x h)	: 2150 x 1350 x 1400
Tank Dimension (radius x length)	: 750 x 1500
Tank Capacity (Liters)	: 396
Power consumption (KW)	: 8

3. SE-5001 (500 Kg/batch)

Machine Dimension (l x b x h)	: 2345 x 1445 x 1580
Tank Dimension (radius x length)	: 880 x 1700
Tank Capacity (Liters)	: 595
Power consumption (KW)	: 9

4. SE-1H (1000 Kg/batch)

Machine Dimension (l x b x h)	: 3140 x 1715 x 1770
Tank Dimension (radius x length)	: 1000 x 2200
Tank Capacity (Liters)	: 1161
Power consumption (KW)	: 12

Components of the Machine

- The Machine is built with high quality SS-304 grade Steel
- Stainless Steel processing tank
- Jacketed Thermic Fluid, Heating Chamber, Heating Coils.
- Agitator arms for mixing the mass during the Process
- Geared Motor for Agitator rotation
- Vacuum Blower for air circulation
- Air cooled Condenser
- Mounting Frame and Body Panels.

- A PLC based Control Panel for running the Operation sequence. The process is fully Programmable as per the requirement.
- Clear water outlet for draining the condensate during the process.
- Output Discharge door provided for taking the output after the process completion.
- Air filter provided for filtering the dust particles.
- Input door provided on the top with Sensors for depositing the food waste into the Chamber.

Infrastructure Requirement

- Shelter to keep the machine with clear air circulation.
- Power Requirement –Industrial socket with 3 phase, 50Hz, 415V.
- 3 phase Power supply with 1 Neutral and 1 Earth.
- Drain duct next to the machine for discharging the condensed water.
- Storage / Collection bins for collecting the output from the Machine.

O & M Protocol

- Open top door, take filter screen and clean and place it in the filter slot.
- Waste input must not exceed the shaft level.
- Clean top and front door (inner side and rubber seal) before closing.
- Start processing the waste by selecting the appropriate mode with respect to the quantity of waste loaded in the machine as Low, Medium or High as per the user manual.
- Once the process is completed, place a bin or tray just below the front door for collection of the Output.
- Processed waste can be used as a soil conditioner. Repeat the same procedure for each batch.
- While loading the waste, at most care shall be given for not to insert non bio-degradable, Petrochemical and Cloth materials into the processing tank.

VI. Mosquito Free Biogas plant (0.75 m³ or 5 kg/day capacity)

Mosquito Free Biogas plant with the following specification and size

- 500 liter capacity, 4mm thick FRP made Digester.
- 300 liter capacity Gas holder made of 2 mm thick Geo membrane sheets inserted inside, the 30 cm depth water column for water sealing. An over lapping wing of gas holder is fixed outside the digester for better air sealing.
- 5 liter capacity PVC made inlet tank with lid.
- 3 inch diameter, 6kg/cm², 70 cm height PVC inlet pipe fixed 30 above from bottom of digester.
- 4 inch diameter, FRP molded 40 cm height S curved out let pipe fixed 40 cm below the digester top edge.
- Supporting frame made of 2mm GI tube, complete with all nuts and bolts for supporting the gas holder balloon.
- 5Kg cement concrete block as counter weight to be placed over the gas holder to generate good gas pressure.
- 5 liter capacity FRP made round shaped weight cap.
- 5 M length gas connection rubber hose with inbuilt safety valve.
- 1 No. of 12 cft Stainless steel single burner gas stove.

Infrastructure Requirement

- Treatment capacity - 5 kg of solid waste per day.
- Digester - 500 liter capacity, 4 mm thick FRP made.
- Gas holder - 300 liter capacity, made of 2 mm thick Geo membrane sheets inserted inside, the 30 cm depth water column. An over lapping wing of gas holder is fixed outside the digester.
- Inlet tank with lid - 5 liter capacity PVC made.
- Inlet pipe - 3 inch diameter, 6kg/cm², 70 cm height PVC pipe, fixed 30 above from bottom of digester.
- Out let pipe - 4 inch diameter, FRP molded 40 cm height, S curved structure, fixed 40 cm below the digester top edge.
- Supporting frame - made of 2mm GI tube, complete with all nuts and bolts.
- Counter weight - 5Kg cement concrete block as.

- Weight cap - 5 liter capacity FRP made round shaped.
- Gas tube - 5 M length gas connection rubber hose with inbuilt safety valve.
- Gas stove - 1 No. of 12 cft Stainless steel single burner gas stove.

O & M Protocol

- Adding 50 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 5 kg/day.
- The gas connector is fixed to the stove.
- Hot water or curd is introduced as digestion accelerator.
- Empty the over flow slurry/ effluent using a can/ plastic bucket by opening the out let pipe cap. (If toilet waste is also treated in biogas plant, slurry from 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.

VII. Mosquito Free Biogas plant (1.50 m³ or 10 kg/day capacity)

Mosquito Free Biogas plant - with the following specification and size.

- 1000 liter capacity, 4mm thick FRP made Digester.
- 700 liter capacity Gas holder made of 2 mm thick Geo membrane sheets inserted inside, the 30 cm depth water column for water sealing. An over lapping wing of gas holder is fixed outside the digester for better air sealing.
- 5 liter capacity PVC made inlet tank with lid.
- 3 inch diameter, 6kg/cm², 70 cm height PVC inlet pipe fixed 30 above from bottom of digester.
- 4 inch diameter, FRP molded 40 cm height S curved out let pipe fixed 40 cm below the digester top edge.
- Supporting frame made of 2mm GI tube, complete with all nuts and bolts for supporting the gas holder balloon.
- 5Kg cement concrete block as counter weight to be placed over the gas holder to generate good gas pressure.
- 5 liter capacity FRP made round shaped weight cap.
- 5 M length gas connection rubber hose with inbuilt safety valve
- 1 No. of 12 cft Stainless steel single burner gas stove.

Infrastructure Requirement

- Treatment capacity - 10 kg of solid waste per day.
- Digester - 1000 liter capacity, 4mm thick FRP made
- Gas holder - 700 liter capacity, made of 2 mm thick Geo membrane sheets inserted inside, the 30 cm depth water column for water sealing. An over lapping wing of gas holder is fixed outside the digester for better air sealing.
- Inlet tank with lid - 5 liter capacity PVC made.
- Inlet pipe - 3 inch diameter, 6kg/cm², 70 cm height PVC pipe, fixed 30 above from bottom of digester.
- Out let pipe - 4 inch diameter, FRP molded 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 liter 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 liter/day.
- The gas connector is fixed to the stove.
- Hot water or curd is introduced as digestion accelerator.
- Empty the over flow slurry/ effluent using a can/ plastic bucket by opening the out let pipe cap. (If toilet waste is also treated in biogas plant, slurry from 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.