



Technology Description (TD) for Anaerobic Digestion Technologies

Contact Information:

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Technology Description:

NAME OF TECHNOLOGY	Reactor with pressure mixing system
ASSIGNMENT OF TECHNOLOGY	Reactor for micro-biogas plant
TECHNICAL READINESS LEVEL	<p>TRL 1 - basic principles observed</p> <p>TRL 2 - technology concept formulated</p> <p>TRL 3 - experimental proof of concept</p> <p>TRL 4 - technology validated in lab</p> <p>TRL 5 - technology validated in relevant environment (industrially relevant environment in case of key enabling technologies)</p> <p>TRL 6 - technology demonstrated in relevant environment (industrially relevant environment in case of key enabling technologies)</p> <p>TRL 7 - system prototype demonstration in an operational environment</p> <p>TRL 8 - system completed and qualified</p> <p>TRL 9 - actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)</p>
What is the core innovation? (Please	<p style="text-align: center;">1 2 3 4 5 6 7 8 9</p> <p>The solution reduces the number of</p>



explain here what is innovative on this technology and which problem does the technology solve.)		mechanical devices in a biogas plant. The lack of mechanical stirrers and pumps limits the energy costs.
Vision of the innovation (Please describe here what impact you see for the future)		Competitive for micro and small installations. It can be used for organic fraction of waste fermentation as well as agricultural organic wastes.
What are the R&D needs for your technology? (Are there any barriers or challenges which still need to be overcome?)		The solution of placing the mixing nozzles should be developed.
TECHNOLOGY/EQUIPMENT AVAILABILITY		
PATENT RIGHTS		YES/NO
METHOD OF MAKING THE TECHNOLOGY AVAILABLE	<i>Licence selling</i>	YES/NO
	<i>Licence granting</i>	YES/NO
POSSIBLE END USERS OF TECHNOLOGY	<i>Please name end users/ contacts that should be invited to project workshops</i>	This technology is recommended for micro and small biogas plant. Different kind of substrates can be used.

Description of the technology/equipment:

The micro biogas plant with a pressure mixing system can be made in the form of a plastic or concrete tank with a circular cross-section. The effective mixing of the sludge is ensured by profiled at 90° bottom of the tank (1). Substrates for fermentation are supplied by well (2). The inlet well is equipped with a cover that eliminates odor release. The introduction of a new portion of substrates is preceded by pumping of the digestate to the disposal well (3). Optionally, the digestate can gravitationally flow to digestate storage tank. The obtained biogas is discharged into the separator (4). The valve supplies biogas to the blower (5). The blower presses the biogas of the fermentation chamber (1) in such a way as to facilitate the introduction of a new portion of substrates. Biogas is discharged from the reactor by valve that enables biogas removal but prevents suction from outside the reactor.

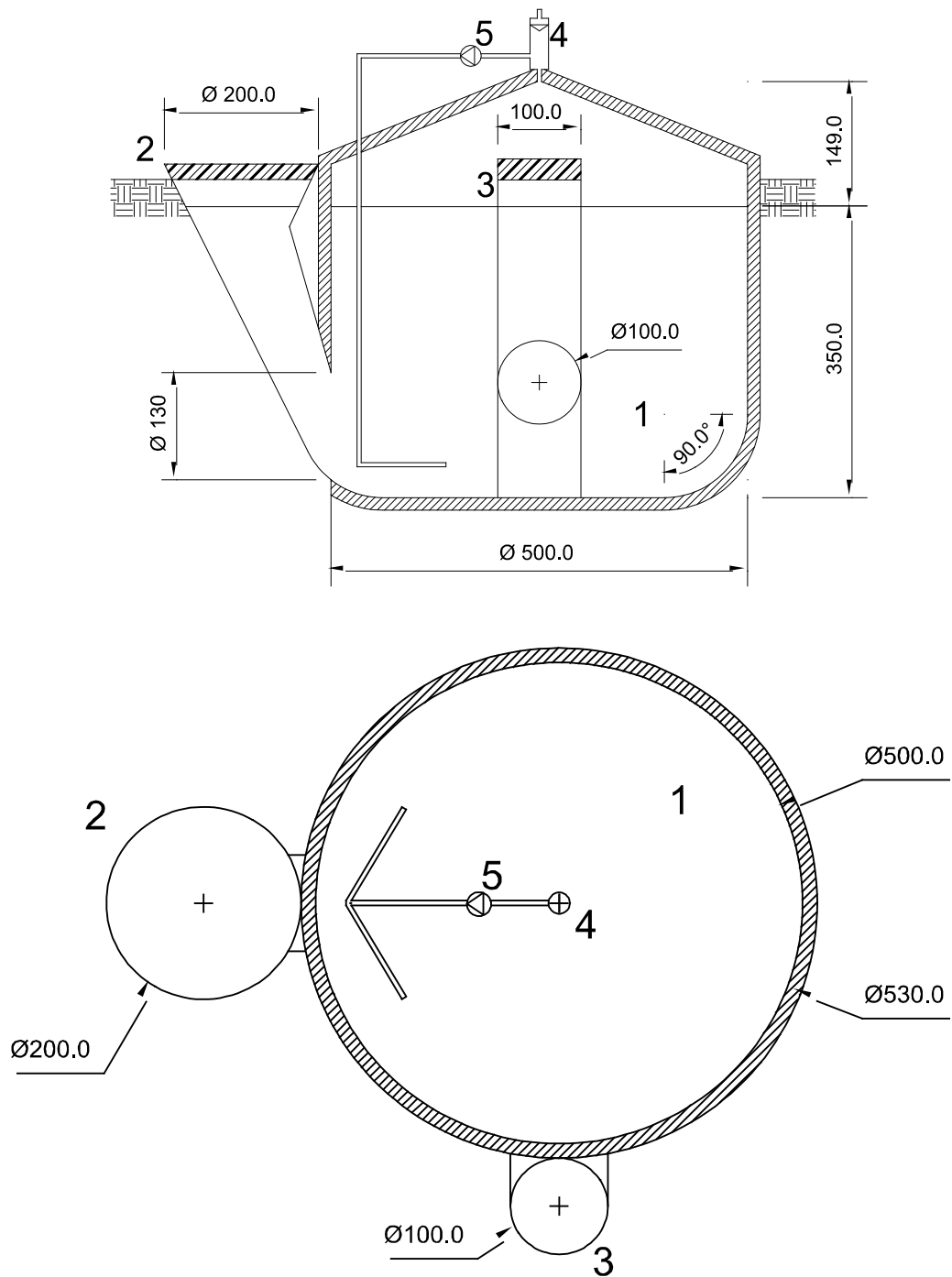


Fig. 1 Scheme of the reactor with a pressure mixing system

- 1) fermentation tank, 2) well for substrate supply, 3) well for digestate disposal, 4) biogas outlet with recirculation separator/outlet, 5) biogas recirculation pump



Technical Data:

Parameter		Value (please fill or tick) If value not available, please give estimate (and indicate with *).	Comments (e.g. which condition does the entered value correspond to?)
<i>Current technology</i>	Biogas production rate of technology at current TRL-level (Nm ³ /h)	4.25	
<i>Data basis for following data list</i>	1.: market ready stage of technology (based on test runs of current techn.) Please only use 2. or 3. if 1. not at all possible. 2.: market ready stage of technology (based on estimate) 3.: current level (TRL) of technology	1 <input type="checkbox"/> (preferably) 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/>	
<i>Technical efficiency</i>	Methane content in biogas (%)	45-65	Depending on the substrate
<i>Capacity</i>	Flow rate and type per substrate (Mg/h)	0.030-0.045	
	Biogas production rate (range) (Nm ³ /h)	≈ 4.25	Depending on the substrate
	Possible range for upscaling	Up to 150 (Nm ³ /d)	
<i>Data for assessment of economical added value, possible contribution to GHG-reduction and availability</i>	Fermenter and biogas process technology (e.g. continuously stirred reactor, plug flow digester, box or garage type)	CSTR	
	Electricity demand (kWhel/Nm ³ biogas)	0.20	
	Heat demand (kWhth/Nm ³ biogas)	2.70	
	Chemical/additives demand (kg/h or kg/Nm ³ biogas)	not necessary	
	Demand of other substances (kg/h or kg/Nm ³ biogas)	not necessary	



Temperature in fermenter (°C)	30 - 40	
Pressure of biogas at exit of fermenter (bar _{abs})	0.125	
m ³ fermenter volume used	68	
Full load hours (h/a)	8000	
Hydraulic retention time (days)	60	
Max. dry matter content (%)	15	
Organic loading rate (kg VS/m ³ d)	2-3	
Space requirement (m ²)	50	
Staff requirement (excluding maintenance) (h/a)	730	
Specific capital costs (excluding project development, planning, permission and additional building costs) (€/Nm ³ /h)	<p>Please give exact specific cost if possible, if not please specify range.</p> <p><input type="checkbox"/> < 5.000 €/Nm³/h</p> <p><input type="checkbox"/> 5.000 - 10.000 €/Nm³/h</p> <p><input checked="" type="checkbox"/> 10.000 € - 15.000 €/Nm³/h</p> <p><input type="checkbox"/> > 15.000 €/Nm³/h</p>	
Maintenance costs (including spare parts, staff) (€/a or €/operating hour)	2000	Costs have not been calculated yet. presented value it is approximation
Production costs (€/Nm ³ biogas)	0,2-0,3	Costs have not been calculated yet. presented value it is approximation
Expected lifetime of unit (years)	15	



<i>Flexibility</i>	Types of substrate (solid and liquid)	Solid and liquid	
	Start-stop-flexibility	low	
	Part-load possibility	<input checked="" type="checkbox"/> Yes, 50% of full capacity <input type="checkbox"/> No	
	Is self-maintenance of technology possible?	<input checked="" type="checkbox"/> Yes, 90% of total maintenance hours per year that can be done by operator himself <input type="checkbox"/> No	
	Necessity for adaptations of other parts of the plant	no	
	Advantages/disadvantages of technology	Advantages: simple mixing system /disadvantages using for substrate with low density.	
	Special application area of technology	Technology for substrates with high level of hydration	