ISO 9001认证 CE认证 高新技术企业

BIOGAS SOLUTIONS

QINGDAO HAIYUE

Contents

QINGDAO HAIYUE MEMBRANE STRUCTURE CO. , LTD

Established in April 2012 in the coastal city of Qingdao, Haiyue Biogas specializes in the development and production of double membrane gas holders, GFS assembly tanks, and other environmental and new energy equipment. Over the past decade, we have become a leader in China's double membrane gas holder and GFS tank industry, thanks to our commitment to innovation and customer service.

Our core products include double membrane gas holders and GFS assembly tanks, complemented by biogas purification, desulfurization, and wastewater treatment solutions. We hold several patented technologies and have received certifications such as "CE Certification" and "ISO9001 Quality Management System Certification." In 2021, we were recognized as a "High-Tech Enterprise" and a "Specialized and Innovative Enterprise" in Qingdao.

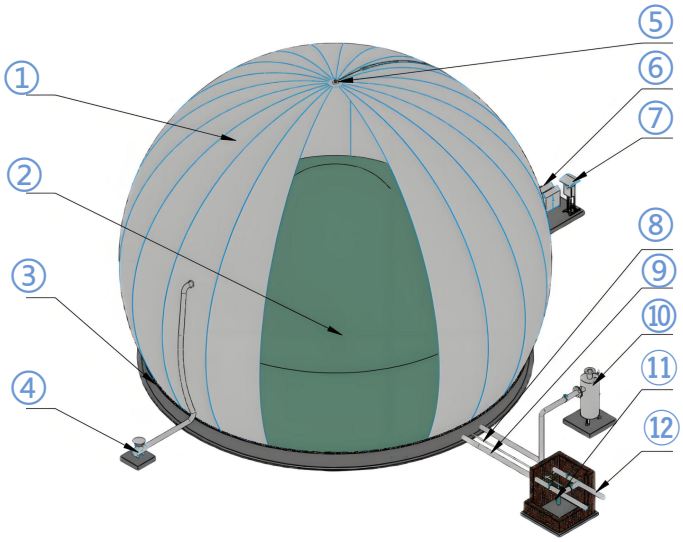
With advanced German design solutions and professional production equipment.Haiyue Biogas has installed over 3,000 sets of equipment worldwide. Our products serve various renewable energy sectors, including livestock farms, landfills, industrial wastewater treatment, biomass gas projects, and kitchen waste biogas projects.Our high-quality products and attentive after-sales service have earned us the trust of customers globally.

Haiyue Biogas is committed to customer satisfaction and employee growth, striving to become a world-class provider of environmental and new energy engineering solutions.

DOUBLE MEMBRANE GAS HOLDER

The double membrane gas holder is a durable air-supported structure designed specifically for the storage of biogas.Typically,gas holders are installed as part of anaerobic digestion systems in wastewater treatment plants,agricultural digestion projects,landfill sites,and cogeneration plants that utilize biogas generated from organic materials as an energy source.

The double membrane gas holder is primarily composed of three components:the outer membrane,inner membrane,and base membrane.The outer membrane serves a protective role for the system.Even under extreme conditions such as storms,the outer membrane continuously withstands positive pressure to maintain hydrostatic equilibrium.The inner membrane is used for storing biogas and expands or contracts based on the gas volume.The base membrane separates the foundation from the inner and outer membranes.Both the inner and outer membranes are made from specialized high quality biogas membrane material,possessing qualities such as UV resistance,aging resistance,abrasion resistance, methane permeation resistance,and a certain level of self-cleaning capability.



1. Outer membrane
2. Inner membrane
3. Anchoring system
4. Pressure relief valve
5. Level transmitter
6. Air blower
7. Control system
8. Drain pipe
9. Outlet pipeline
10. Safety water seal
11. Condenser
12. Inlet Pipe

ADVANTAGES:

- Low cost
- Security and stability
- High tensile strength
- Tear resistance
- Abrasion resistance
- Air tightness
- Self-cleaning function
- antioxidant
- Uv protection
- Corrosion resistance
- High utilization rate
- Save space
- Short construction period
- Antifreezing

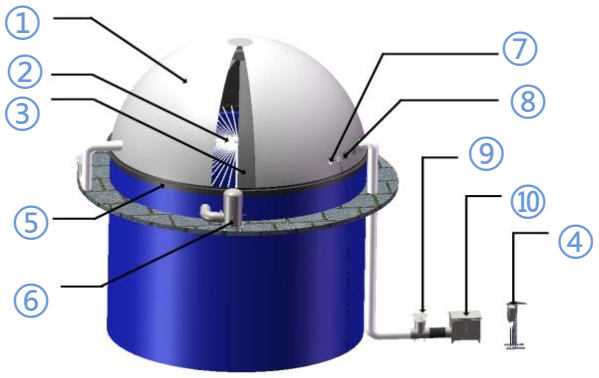
DOUBLE MEMBRANE GAS HOLDER TANK ROOF

The double membrane gas holder tank roof combines fermentation gas storage into a single unit.The bottom portion consists of a digester tank body,while the upper portion is a 3/4 spherical gas storage structure made of special polyester material,This design greatly conserves ground space.

The outer membrane of the mounted double membrane gas holder is sealed and connected to the tank opening edge of the fermentation tank independently,while the inner membrane is used for storing generated biogas.They are both anchored to the embedded fasteners in the foundation and sealed.The inner membrane stores the produced biogas and releases it as needed under the control of the outer membrane's pressure.

The safety protection system is designed to safeguard the Haiyue double membrane gas holder by preventing excessive pressure in the inner or outer membrane due to system malfunctions,ensuring controlled discharge. The control cabinet system primarily detects gas holder pressure and inner membrane capacity, allowing for pressure relief protection and control of gas intake as per the design requirements.

The role of the outer membrane of the biogas holder is to create a pressure-regulating space,providing constant external pressure to the inner membrane to maintain a consistent biogas output. Simultaneously, the outer membrane offers protection to the inner membrane.



1. Outer membrane
2. Safty system
3. Inner membrane
4. Control system
5. Anchoring system
6. Positive and negative pressure water seal
7. Pressure sensor
8. Inspection window
9. Pressure relief valve
10. Air blower

ADVANTAGES:

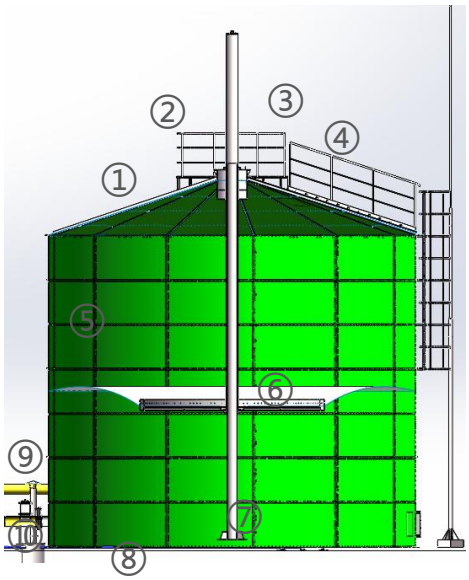
- High operating pressures
- High volumes up to a hemispherical shape
- Suitable for high snow and wind loads
- Permanently gas-tight
- Low investment and running costs
- Short construction time
- High reliability
- Various fittings possible

Floating-Drum Gas Holder

The floating-drum gas holder, also known as a biogas pressure stabilization tank or floating-boat biogas pressure device, is specifically designed for controlling the pressure of biogas in the anaerobic stage of wastewater treatment. This system effectively buffers fluctuations in biogas production, ensuring a stable gas supply.

Its core internal component—the floating drum—is equipped with a concrete counterweight on top to achieve precise pressure regulation. When the working pressure gradually rises to the preset value, the floating drum slowly ascends along a precisely designed guide rod as the biogas volume increases. Conversely, when the biogas volume decreases, the floating drum smoothly descends along the guide rod, maintaining the pressure within the normal operating range of 2–4 kPa and ensuring the safety and efficiency of the entire biogas utilization process.

The external structure of the floating-drum gas holder consists of the tank wall, tank roof, vertical ladder, gas inlet and outlet, maintenance manhole, and level gauge.
The internal structure consists of the central column, guide rods, floating drum, gas bag, gas bag pressure strip, and drainage pipe.



1. Shell
2. Level transmitter
3. Breathing hole
4. Check hole
5. Gas cell
6. Floating boat
7. Center part
8. Foundation
9. Gas inlet
10. Gas outlet

ADVANTAGES:

- Stable Pressure Control
- High Safety Factor
- Long Service Life
- Precise Adjustment
- Low Power Consumption
- Simple Structure & Easy Maintenance
- High Adaptability



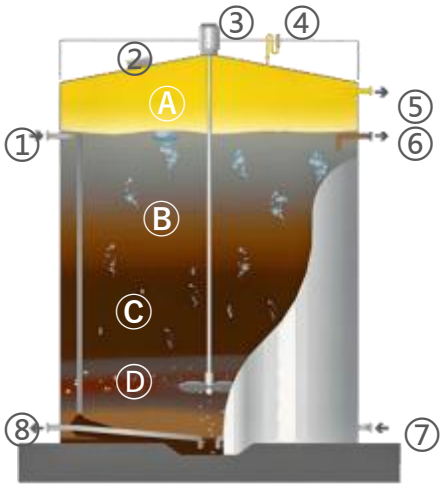



GLASS-FUSED-TO-STEEL(GFS) TANK

Glass-Fused-to-Steel (GFS) tanks, also known as enamel assembly tanks,are composite products composed of multiple steel plates coated with enamel material, assembled in a rational manner.These tanks exhibit excellent corrosion and heat resistance, making them suitable for various temperature and humidity environments.

Assembled GFS tanks are widely used in engineering fields such as anaerobic tanks and sewage treatment equipment in industries like biogas, sewage treatment, chemical processing, and power generation. They are also utilized for steel storage tanks, including grain silos,oil storage tanks, feed storage tanks, and wine material tanks. Additionally,GFS tanks are employed in the fabrication of drinking water and wastewater containers,filters,cookers,bioreactors,wastewater sedimentation tanks,intermediate process tanks,and fermentation tanks.

The main structure of assembled GFS tanks includes assembly steel plates,reinforced angle steels for the tank top, wall, and bottom,as well as connecting blocks and specially designed installation bolts.Weather-resistant silicone sealing compounds are also used to ensure durability and performance.



Take the CSTR tank for example

1. Substrate inflow
2. Access hole
3. Mixer
4. High-pressure valve
5. Gas outlet
6. Substrate outlet
7. Ground injection pipe
8. Ground sludge pipe

A. Biogas
B. Fluid zone
C . Sludge zone
D. Mixing zone

ADVANTAGES:

- Superior anti - corrosion technology
- Wide range of applications
- Designed according to local conditions , according to the project construction location, the GFS tank adopts resistance and other targeted design
- Rational use of the environment
- High degree of standardization
- Simple and quick installation , easy to realize the relocation and expansion of capacity

GLASS-FUSED-TO-STEEL(GFS) TANK

Various Forms of Anaerobic Tanks

Continuous Stirred Tank Reactor (CSTR)

The Continuous Stirred Tank Reactor (CSTR) is an anaerobic treatment technology that keeps the fermentation materials and microorganisms in a completely mixed state. Its most characteristic feature is the agitator inside the tank, which aims to achieve uniformity in the material system, facilitating even reactions and heat transfer.

Upflow Solid Reactor (USR)

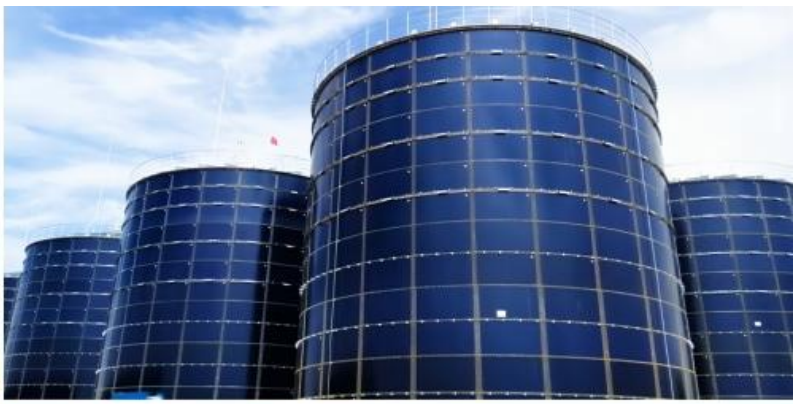
The Upflow Solid Reactor (USR) is designed specifically for anaerobic treatment of materials with high solid content. Its structural features include the absence of a three-phase separator and mechanical agitator inside the tank. Water is evenly distributed at the bottom of the tank, and the use of supernatant hydraulic circulation allows the biogas produced to rise with the water flow, creating gas mixing that promotes full contact between microorganisms and materials. Due to gravity, there is natural sedimentation in the solid bed area, which maintains a high amount of sludge and anaerobic microorganisms in the reactor, allowing for longer retention times of microorganisms and solids.

Upflow Anaerobic Sludge Blanket Reactor (UASB)

The Upflow Anaerobic Sludge Blanket (UASB) Reactor is one of the fastest-growing anaerobic reactor types. It is characterized by the upward flow of wastewater through an expanded granular sludge bed. The digester is divided into three zones: the sludge bed, the sludge layer, and the three-phase separation zone.

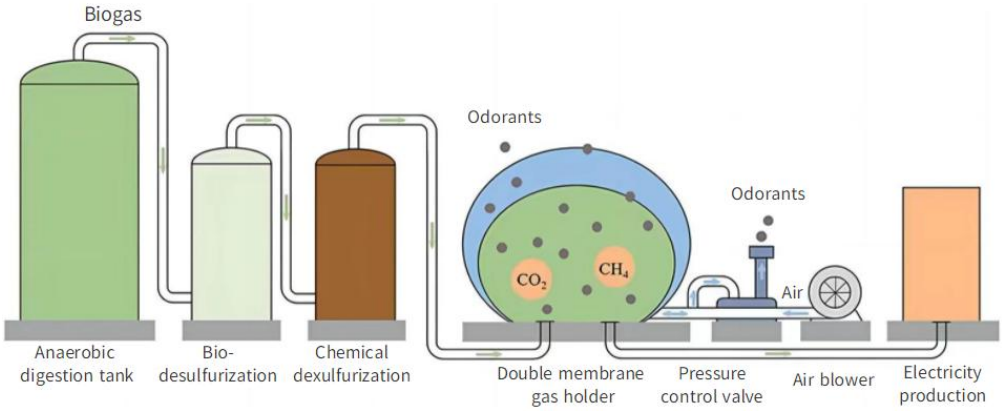
Internal Circulation Anaerobic Reactor (IC)

The Internal Circulation (IC) anaerobic reactor features biological degradation occurring in two zones, with a three-phase separator at the top of each anaerobic reaction zone. It is mainly used for the treatment of high-concentration organic wastewater, wastewater with high suspended solids content, and wastewater with biological toxicity. Applications include wastewater from corn starch, beer, and alcohol production.



BIOGAS DESULFURIZATION



When utilizing biogas for energy purposes, the H2S content in the biogas gas must not exceed 20mg/m3. H2S must be removed as much as possible in both industrial and domestic gases.

Biogas from anaerobic digesters carries a large amount of H2S , especially when fermented at medium or high temperatures. Since there is also a large amount of water vapor in the biogas, the water interacts with the H2S in the biogas and accelerates the corrosion and clogging of metal pipes, valves and flow meters. In addition, the SO2 generated by the combustion of H2S combines with the water vapor in the combustion products to form sulfurous acid, which corrodes the metal surfaces of the equipment and also causes pollution of the atmosphere, affecting human health. Therefore, before using biogas, H2S must be removed.

1.Dry Desulfurization

Principle: This method uses iron oxide or activated carbon to react with hydrogen sulfide (H_2S) in biogas, forming iron sulfide, which can then be regenerated back to iron oxide.
Applications: Suitable for small-scale biogas plants or applications where the H_2S concentration is not very high.

2.Chemical Desulfurization

Principle: This method uses a chemical solution (such as an alkaline solution or oxidizing agent) to absorb and oxidize hydrogen sulfide.
Applications: Suitable for medium to large-scale biogas plants, especially with high H_2S concentrations.

3. Biological Desulfurization

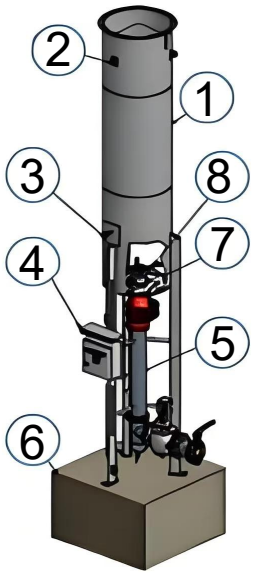
Principle: This method utilizes specific microorganisms in a bioreactor to oxidize H_2S into elemental sulfur or sulfate compounds.
Applications: Suitable for small to medium-sized biogas plants, particularly where environmental concerns are significant.

BIOGAS FLARE

During the production process of biogas engineering, a large amount of by-product gases with combustible components are often produced. Due to the different production processes of producing by-product combustible gases and the use of combustible gases by the users at the site,it is sometimes necessary to dissipate these combustible gases. If directly dispersed, combustible gases and the surrounding air diffusion and mixing of combustible gases generated clouds, meet the ignition source of deflagration.In addition,combustible gases generally contain carbon monoxide and hydrogen sulfide and other hazardous gases,in accordance with the environmental regulations do not allow the direct emission into the air, so all types of production processes to produce combustible gases by-products need to carry out harmless treatment and then dispersed.

For factories or premises with small gas production,the centrally collected biogas is usually incinerated by setting up a biogas flare.The biogas flare can improve the safety of the premises,reduce pollution, reduce the greenhouse effect and so on.

The scope of application can be selected according to the different conditions of breweries,food processing plants,pharmaceutical factories,sewage treatment plants,alcohol factories,farms,and the biogas flare incineration flow ranges from 50m/h-3000m/h.



1. Flame pipe/combustion
2. Chambercable stay collar
3. Uv probe/flame monitor
4. Ip54 switch cabinet
5. Gas line
6. Foundation
7. Electrode ignition
8. Burner head

ROLE:

· Conveying and combusting waste gases generated in the treatment of the production
· The biogas flare burner handles flammable and explosive gases produced during commissioning , start-up and stopping of the plant.
· The biogas flare burner is used as a measure in case of emergency.

ADVANTAGES:

- Explosion-proof design
- Multi-stage flame retardant safety design
- High load regulation ratio
- Flare tower exterior temperature is lower than 60℃
- The burnout rate is higher than 95%
- Lgnition success rate is higher than 98
- Closed flare design load without open flame
- Easy transportation, installation
- The material is stainless steel or heat- resistant stainless steel, beautiful shape, long service life
- Easy transportation, installation

BIOGAS BOILER

A biogas boiler is a type of boiler designed to use biogas as a fuel for heating or power generation. Biogas is produced through the anaerobic digestion of organic waste materials, such as agricultural residues, sewage sludge,and food scraps.

Biogas is burned in the combustion chamber, producing high-temperature gases.During combustion,the methane in the biogas reacts with oxygen to form carbon dioxide, water vapor,and heat.

The high-temperature gases pass through a heat exchanger, transferring heat to water or another medium.This water is heated into steam or hot water.The steam or hot water produced can be used for heating,hot water supply,or driving turbines for power generation.

Biogas boilers have a wide range of applications,including: provides hot water for industrial facilities,commercial buildings,or residential use.Supplies heat for centralized heating systems in buildings,greenhouses,and other facilities.Uses the heat from the biogas boiler to drive steam turbines or combined heat and power (CHP) systems,generating both electricity and heat.

ADVANTAGES:

- Biogas is a renewable energy source, and using it reduces greenhouse gas emissions compared to fossil fuels.
- The production of biogas is a way to manage organic waste, reducing waste disposal costs and environmental impact.
- Using biogas reduces reliance on traditional fuels, lowering fuel costs.
- Biogas boilers can be used for various applications, including heating, hot water supply, and power generation, offering flexibility.

BIOGAS GENERATOR

A biogas generator is a type of equipment that uses biogas produced from biomass waste (e.g.,agricultural waste, animal and poultry manure) as fuel and converts it into electrical energy through a generator.The working principle involves utilizing the combustion of biogas to produce high-temperature and high-pressure gas,which pushes the rotor of the generator to rotate,thus generating electrical energy.

Biogas generators use the methane in biogas as fuel and generate high-temperature and high-pressure gas through combustion to drive the generator to produce electricity.The working principle is as follows:

Biogas Collection:Biogas is collected from the digester,and impurities,water,and harmful substances such as hydrogen sulfide are removed,ensuring that the biogas meets the fuel requirements of the generator.

Combustion:The treated biogas is introduced into the generator,mixed with air,and burned inside the generator to produce high-temperature and high-pressure gas.

Driving Power Generation:The high-temperature and high-pressure gas pushes the rotor of the generator to rotate,resulting in electricity output.

Exhaust Gas Emission:The exhaust gas generated during the power generation process is purified and discharged.

By utilizing biogas resources,biogas generators not only make use of organic waste but also help reduce greenhouse gas emissions.

ADVANTAGES:

- Compact structure, easy to install and maintain
- Simple and easy to use control system, low maintenance cost
- long service life
- high stability of work
- good high temperature resistance characteristics
- good seismic performance
- With combustible gas fuel cell system.
- trong environmental adaptability

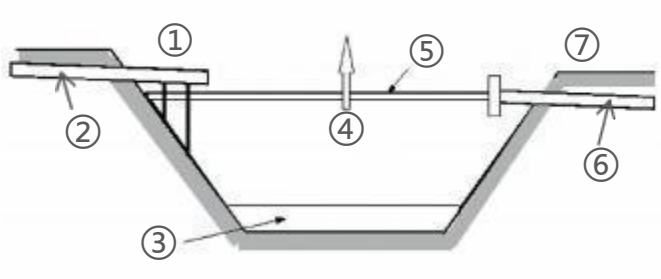
BLACK MEMBRANE POND

A black membrane pond,also known as a black membrane lagoon,is an anaerobic treatment facility used in wastewater management.It employs a black membrane material to cover the pond's surface, relying on anaerobic microorganisms to degrade organic matter.Black membrane ponds are commonly used to treat high-concentration organic wastewater, especially in rural,agricultural,and small-scale industrial wastewater treatment applications.

Black membrane ponds are usually deep,with a typical depth of over 2.5 meters and sometimes reaching up to 45 meters.The pond surface is covered with an opaque black membrane.This membrane prevents oxygen from entering the pond,while also retaining heat to maintain anaerobic conditions.These ponds have appropriately designed inlet and outlet points to control the flow of incoming wastewater and the discharge of treated water.

Black membrane pond should be set up grille pretreatment facilities, such as sewage sand content or high oil content should be added sand sedimentation tank or degreasing tank.In addition, the effluent from the black film pond is still high in organic matter and needs to be further treated by partially oxygenated ponds and aerobic ponds.

A black membrane pond is an effective anaerobic wastewater treatment technology.Although it poses challenges like odor control and environmental sensitivity, its low energy consumption and resource recovery advantages make it a cost-effective solution for specific applications.



1. Effluent in—organic mater and nutrients
2. Inlet pipe
3. Bottom sludge—solids some organic N and P
4. Gases—carbon dioxide methane ammonia
5. Crusting—solids
6. Overflow pipe
7. Effluent out—higher quality 70% less BOD

Black membrane pond is mostly used to deal with high concentration of organic wastewater, such as meat processing, food industry,livestock and poultry farms and other wastewater.

ADVANTAGES:

1. Pollutants can be degraded 20% to 30%, thus reducing the volume of the subsequent partially aerobic and aerobic ponds;
2. Anaerobic can make part of the difficult to degrade organic matter into easily degradable organic matter, is conducive to the subsequent pond treatment;
3. Wastewater through the black membrane pond can be eliminated in subsequent ponds of the floating and reduce the thickness of the bottom sediment siltation layer.

RED MUD MEMBRANE BIOGAS BAG

A red mud bag, also known as a red mud biogas bag, is a flexible storage device used for storing and processing biogas.It is made from PVC in a bag-like structure and is commonly used in small-scale biogas projects or rural household biogas systems.Red mud bags are favored for their high flexibility, low cost, and ease of installation and maintenance,making them widely used in agriculture,livestock farming,and other sectors that produce organic waste.

Red mud bags are typically made from synthetic rubber or polyvinyl chloride (PVC),which are flexible materials known for their good corrosion resistance, airtightness,and UV resistance.The shape of a red mud bag is usually rectangular or cylindrical,and its size can be customized to meet specific needs. Red mud bags are equipped with inlets and outlets for biogas input and output, as well as for the collection and discharge of liquid fertilizers.

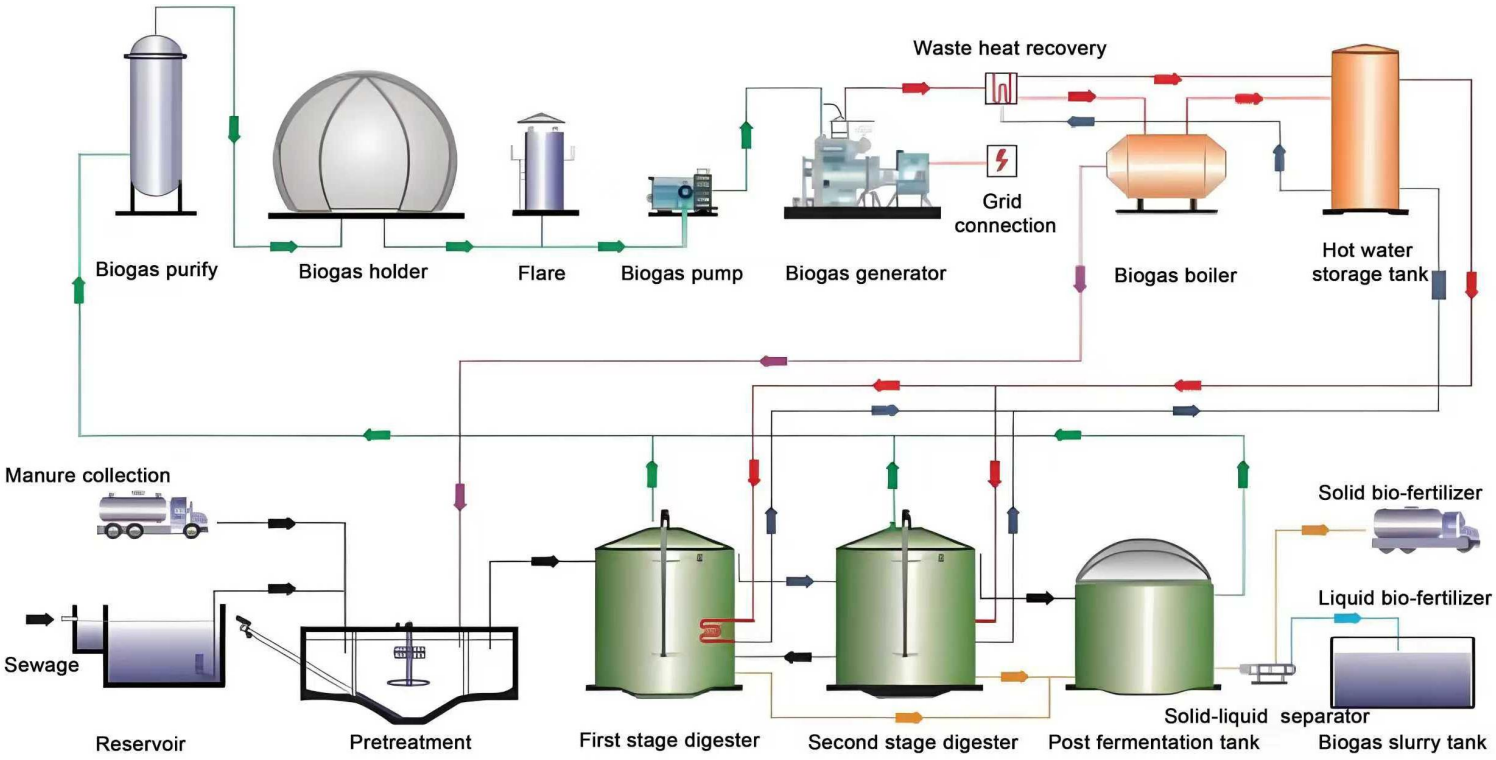
The optimal temperature for anaerobic fermentation in a red mud bag is typically between 30°C and 40°C.Temperatures within this range help maintain microbial activity and the efficiency of anaerobic fermentation.Due to the difficulty in maintaining heat,red mud bags are not recommended for use in cold regions.

Red mud bags are economical and practical devices for biogas storage and processing,widely used in small-scale organic waste treatment projects.They utilize anaerobic fermentation technology to convert waste into renewable energy and organic fertilizer,offering environmental and resource recycling benefits.Despite challenges in durability and airtightness,their low cost and ease of installation make them an ideal choice for many scenarios.

ADVANTAGES:

- Compared to traditional rigid gas tanks or large biogas facilities, red mud bags have lower material and installation costs, making them suitable for budget-constrained projects.
- Red mud bags are simple in structure and easy to install
- The flexibility of red mud bags allows for adjustments in location and capacity as needed.

FLOWCHART



APPLICATION

PROJECT CASES

5000m³ of Vegetable Processing Project in Lanzhou Gansu

3000m³ Jiaozhou Xiaojianxi Solid Waste Project

2000m³ Jiangsu Suzhou Everbright Kitchen Project

2 sets of 2800m³ of Qingdao Biomass Natural Gas

3 sets of 5000m³ CSTR Tanks for Agricultural Waste

Shandong 1000m³ Water Storage Tank

1800m³ UASB Tank for Wastewater from Hebei Pharmaceutical Factory

Xinjiang Enterprise Sewage Treatment 1500m³ IC Tower

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FACTORY ADDRESS

Yanjialing Industrial Park,

Chengma Road,Jimo District,
Qingdao,China

T:+86-18906399700

E:sales@haiyue-biogas.com

W:www.haiyue-biogas.com

Visit our website for the contact

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