



EC  **MEMBRANE**®
ENVIRONMENTAL TECHNOLOGY



ECOMEMBRANE LLC - OFFICES



ECOMEMBRANE LLC - PRODUCTION



THE COMPANY

ECOMEMBRANE has been established for more than 30 years in the fields of environmental and green energy production.

The core business is the production of state of the art components for biogas powered plants.

ECOMEMBRANE has unique production system lines that utilize special plastic membranes and stainless steel domed structures.

The anaerobic digester covers and constant pressure gasholders that ECOMEMBRANE builds are often the main components that allow the use of biogas for electric and thermal energy production.

ECOMEMBRANE is present in more than 30 Countries with offices and production units in Italy and USA and a new unit production in Vietnam.



High Quality

Every product component has been designed with the best materials available, to ensure high performance standards for many years of use.



On Demand Products

All ECOMEMBRANE's products can be manufactured and customized to specific sizes, storage capacities, shapes and colors specified by the client.



High working pressure

In-house designed pressure control valves and use of high quality materials allow ECOMEMBRANE's gasholders to operate at working pressures beyond which our competitors can reach.





ECOMEMBRANE SRL • OFFICES



ECOMEMBRANE SRL • PRODUCTION



ECOMEMBRANE SRL • PRODUCTION



ECOMEMBRANE ASIA



ECOMEMBRANE ASIA • PRODUCTION



ECOMEMBRANE ASIA • PRODUCTION



World Record Storage

ECOMEMBRANE's knowledge and experience has enabled them to manufacture and install the world's biggest membrane gasholders which are ideal for clients who require large gas storage facilities.



Originality

ECOMEMBRANE product designs and methods of manufacture are protected by national and international patents.



Low maintenance

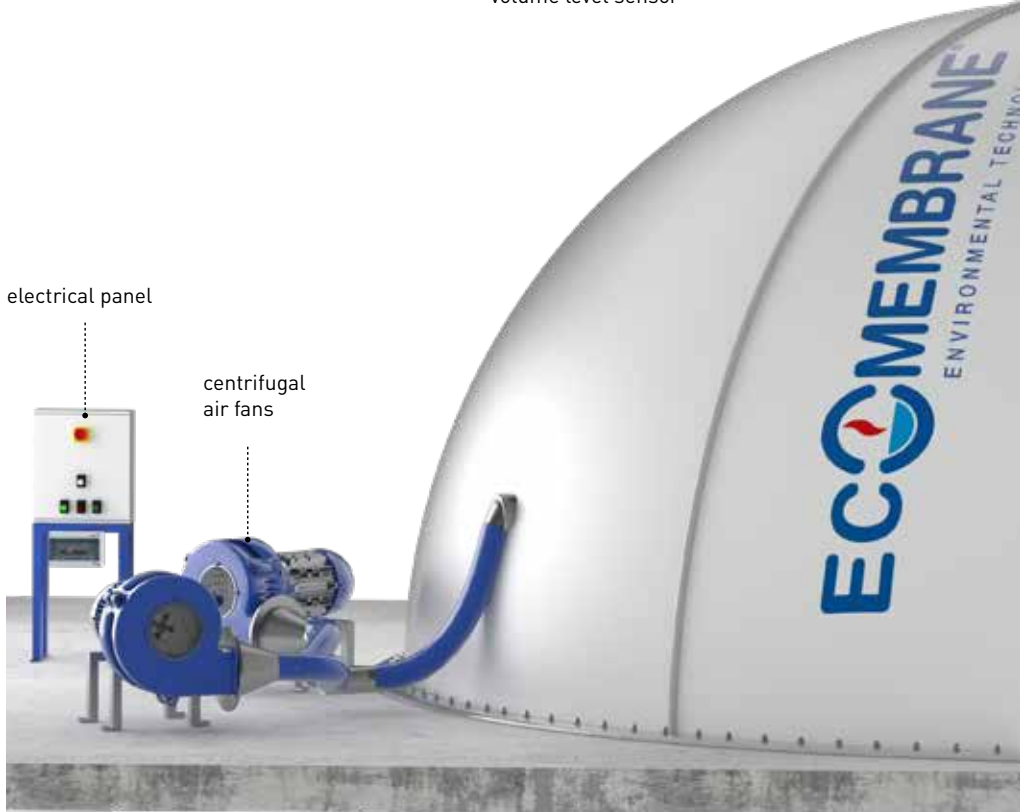
ECOMEMBRANE products are designed and installed with the goal of minimizing maintenance costs over the life span of the product.



volume level sensor

electrical panel

centrifugal
air fans



PATENTED

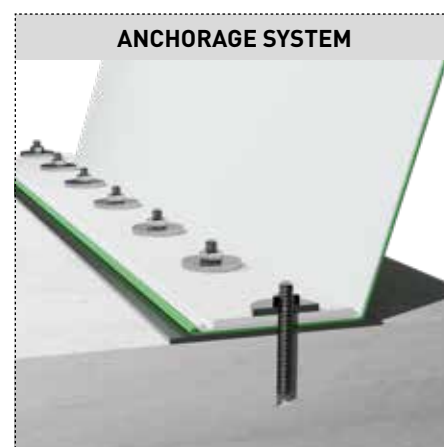
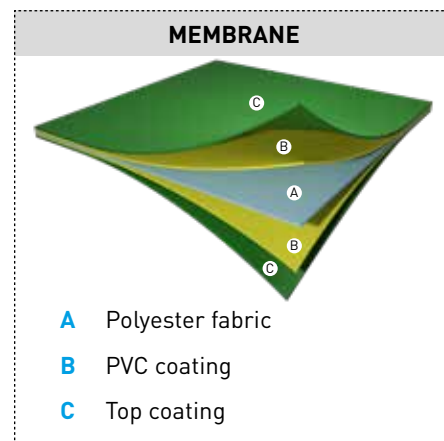
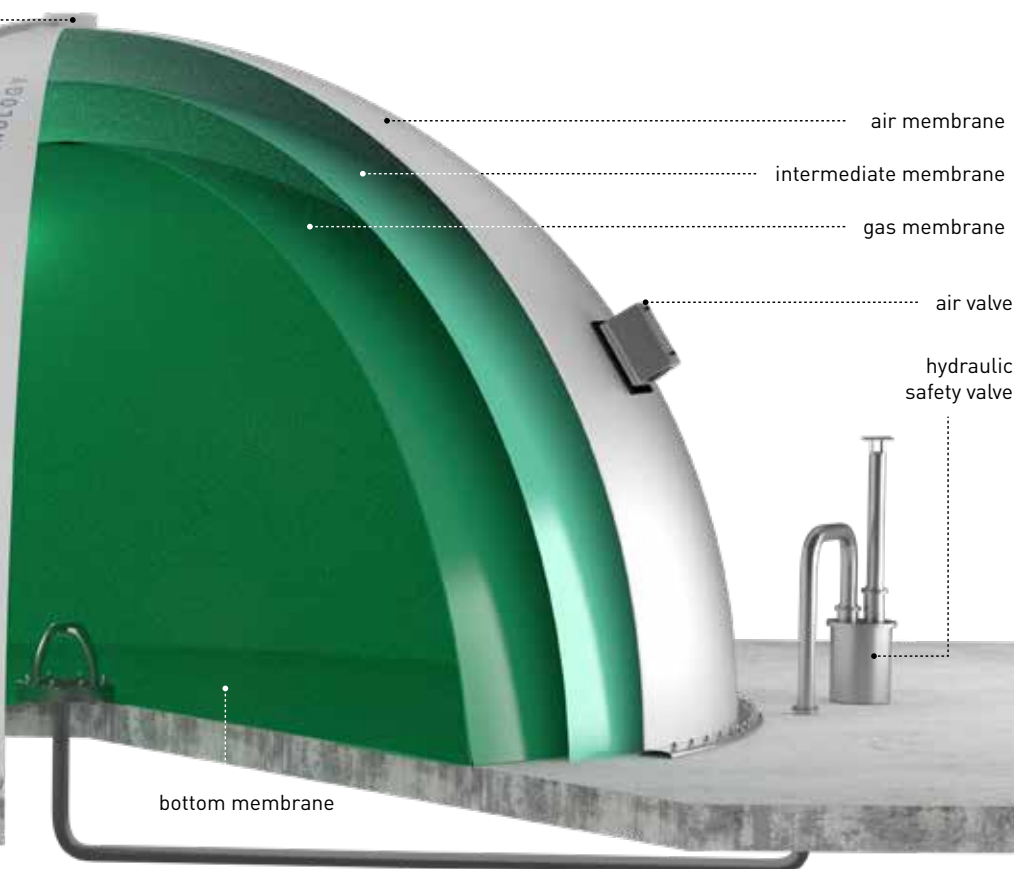
3MASTER®

3 MEMBRANE GASHOLDER

Three membrane constant-pressure gasholders are designed to store biogas made from the anaerobic digestion of organic waste and sludge.

They are manufactured with biogas resistant polyester reinforced PVC membranes seam welded by high frequency electronic machines.

The exclusive 3MASTER system is designed to form an upper air chamber that gives a pneumatic push on the biogas chamber, which keeps the biogas chamber at a prefixed and constant positive pressure. The two chambers are divided from each other by a double membrane layer that ensures complete safety against the formation of a dangerous air and gas mixture. The one-piece gas chamber can be made in the factory, or on site. Closed piece construction prevents gas losses through the anchor bolts that fix the cover to the ground.



MAIN FEATURES



High safety level

ECOMEMBRANE'S patented 3 membrane system **negates any possibility of a gas and air explosive mix** because the biogas chamber is completely divided from the air compensation chamber.



Low energy consumption

The compensation air blower only operates when **the biogas is being used from the gasholder and switches off when the gasholder is filling**. The air blower is controlled by a pressure sensor and an air valve is fitted to the air chamber and set to limit the maximum operating pressure ensuring constant pressure of the biogas throughout the filling and emptying cycle.



Long Life

3MASTER gasholders are **UV resistant** and designed to withstand substantial wind and snow loadings. The internal membrane is biogas tight.

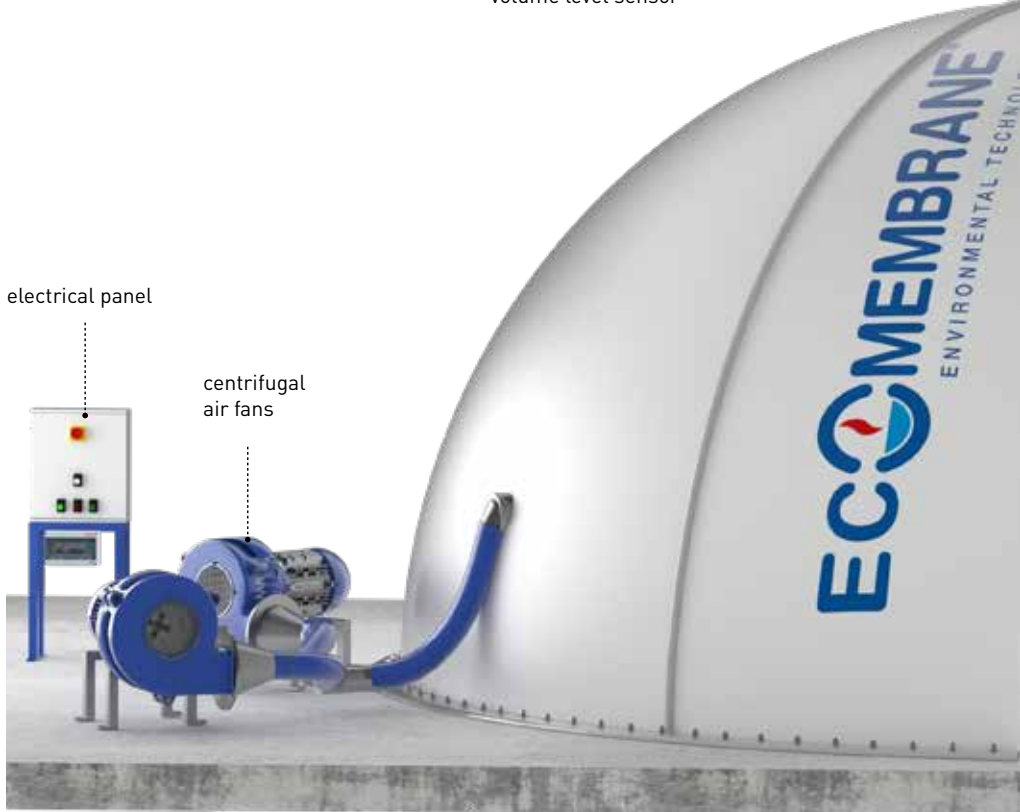




volume level sensor

electrical panel

centrifugal
air fans



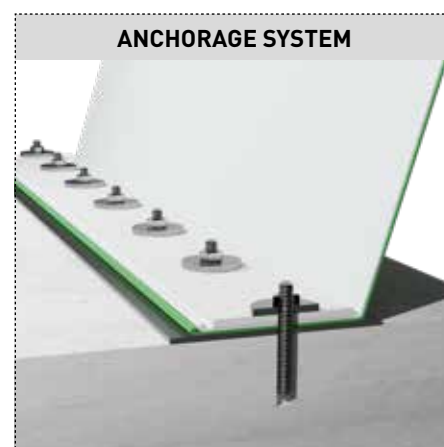
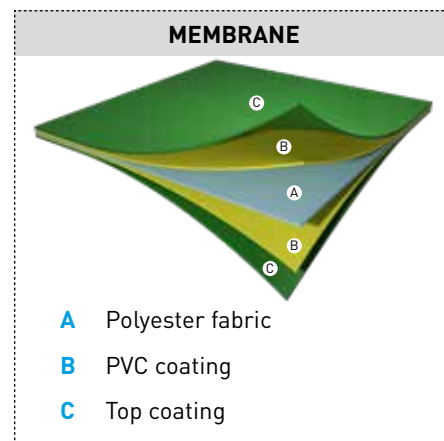
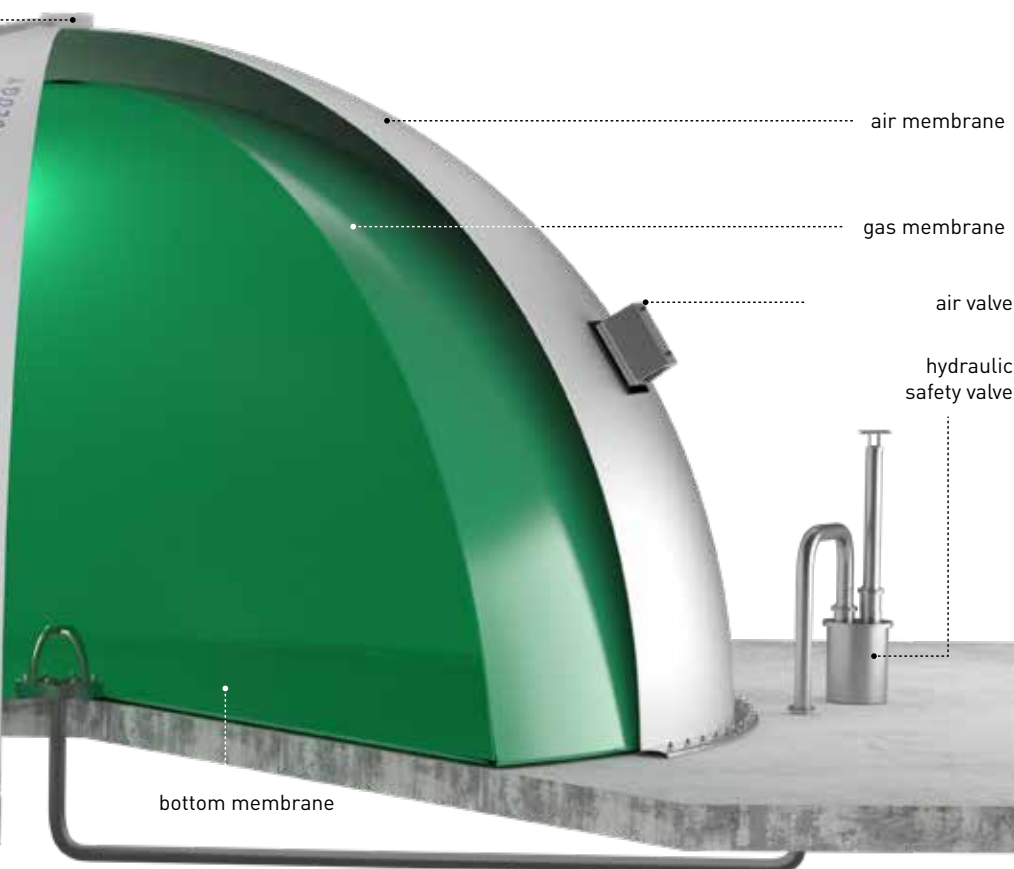
2MASTER®

2 MEMBRANE GASHOLDER

Two membrane constant-pressure gasholders are designed to store biogas made from anaerobic digestion of organic waste and sludge.

They are manufactured with biogas resistant polyester reinforced PVC membranes seam welded by high frequency electronic machines.

The 2MASTER system is made with a single upper membrane, pressurized by an air fan 24 hours a day to give a pneumatic push on the inner biogas chamber, keeping the biogas chamber at a prefixed and constant positive pressure. The one-piece gas chamber can be made in the factory or on site. Closed piece construction prevents gas losses through the anchor bolts that fix the cover to the ground or tank.



MAIN FEATURES



High storage and gas flow rate

The 2MASTER system is suggested for use in all cases where **storage volume is greater than 3000 m³**. The lighter weight of the 2 membrane allows larger gas holders to be constructed. The 2 membrane system is also proposed where high and variable gas flow rates are expected.



Shape variability

It is possible to manufacture **gasholders with either a 1/2 sphere or 3/4 sphere shape**. Big sizes and sites where high winds are expected then a 1/2 sphere gas holder would be recommended. Upon request we can design special shape gasholders with rectangular base.



Low cost

Two membrane construction and a simple air pressurization system used in the 2MASTER system allow for a **low and competitive cost**.





volume level sensor

electrical panel

centrifugal air fans



PATENTED

CUPOLA M3

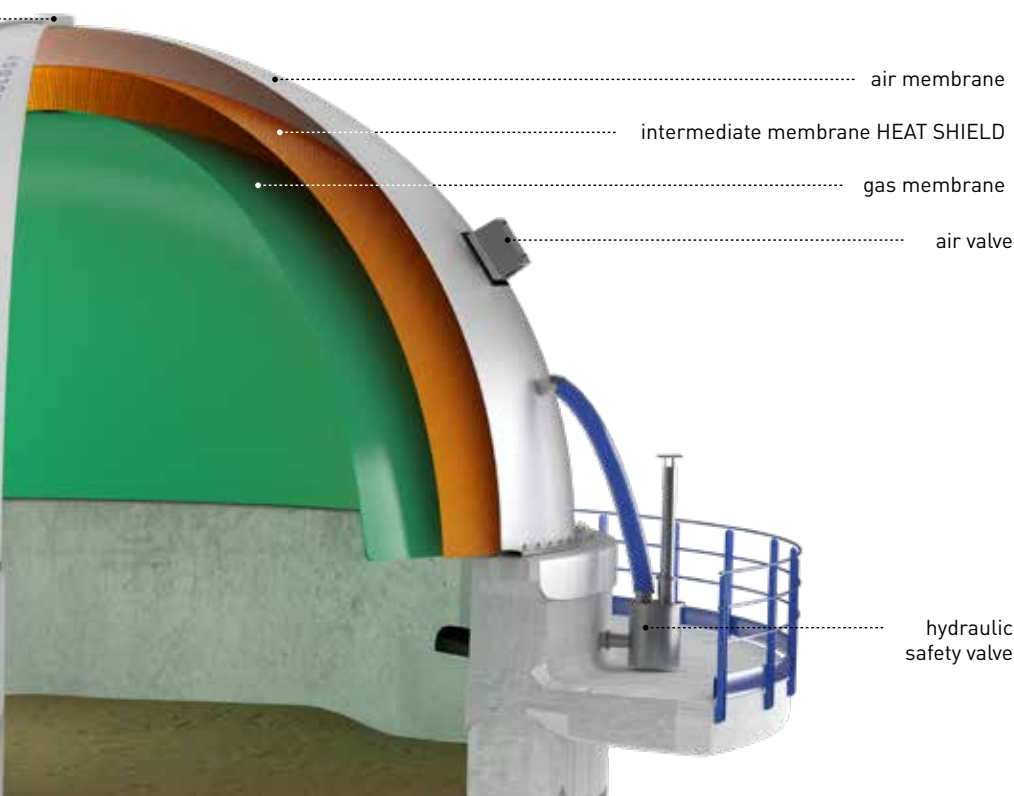
CUPOLA M3 HEAT SHIELD

The primary objective of CUPOLA M3 HEAT SHIELD is to reduce the heat loss from digester at its highest possible level.

SYSTEM DESIGN

The CUPOLA M3 HEAT SHIELD is composed by three layers of membrane working as a roof on the top of the digester:

- The external double-sided PVC coated polyester fiber fabric membrane; it is inflated with air.
- The special insulated Heat Shield intermediate membrane, made by a triple layered ultra-shielded material to separate the inner biogas chamber from the air chamber. The special layers of this membrane act as a protection against heat dissipation in the following way:
 - 1) A layer of aluminum reflects 96% of the radiating infrared heat
 - 2) A layer of bubble polyethylene sheet reduces the heat loss through convection
 - 3) A layer of pure polyethylene sheet gives an high gas tightness to the air chamber thus protecting the inner gas membrane from oxidation.
- The inner double-sided PVC coated polyester fiber fabric membrane, with Eco-Safe layer.



HEAT SHIELD[®]

The CUPOLA M3 HEAT SHIELD is pressurized by a reduced power air fan running 24/24h and is regulated by a special valve that force the air to enter in the air chamber just in case the pressure in the dome is decreasing. Thanks to this combined system, there is a limited exchange of air in the air chamber with a reduction of heat loss due to less flow of cold air. This effect can be reached only in a triple membrane gasholder, because there is no need for a constant air exchange for safety reason, as a result of physical barrier by the intermediate membrane between the two independent chambers (air and gas).

ADVANTAGE POINTS



Reducing of 50% heat transfer

Diminution of heat dissipation: consequently, energy costs for digester warming purposes are drastically reduced. Return on investment are considerably speeded up because of **major energy saving**.



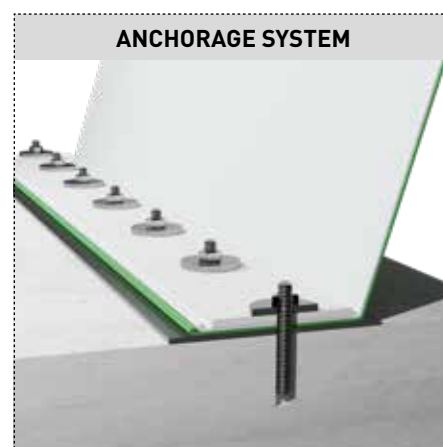
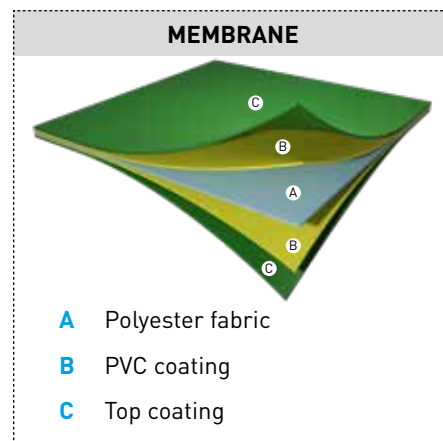
Reduced electric consumption

The "3-membrane" design, as a result of its self-functioning safety system, needs a reduced **electrical power air fan**.



High passive safety against explosion danger

insulating membrane layer produces the complete separation between the air and the gas chamber. **Any eventual gas leak** cannot enter into the air chamber, and the formation of explosive mixture is prevented.



Longer lifetime for the gas chamber membrane

Since the gas membrane is completely covered by the intermediate one (opaque), we do achieve a **protection from any ultraviolet light source and from explosion to direct oxidation by the air pumped by the blowers**.



volume level sensor

hydraulic safety
valve with anti-vacuum

PATENTED

CUPOLA M3®

3 MEMBRANE GAS HOLDER DOME

The constant-pressure CUPOLA M3 is designed to collect and accumulate biogas from directly over anaerobic digesters or sludge holding tanks.

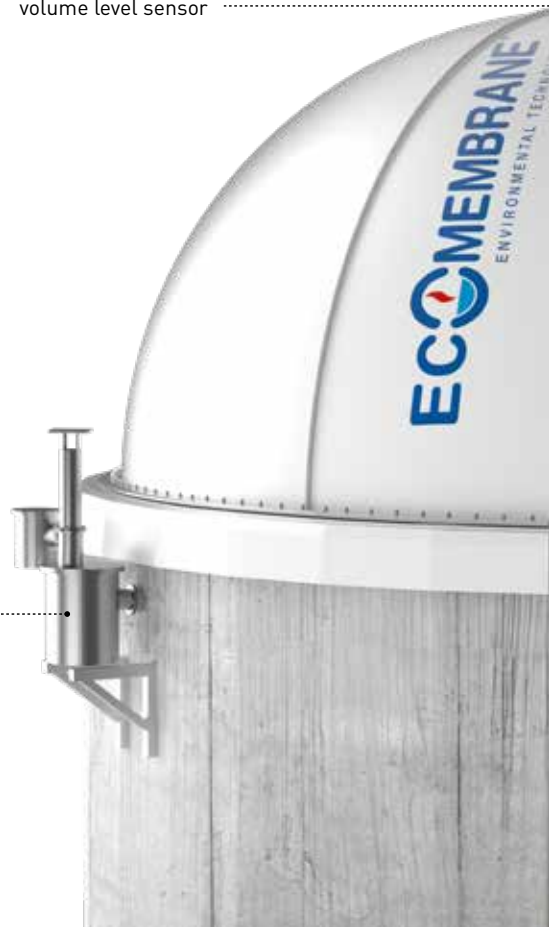
They are made with biogas resistant polyester reinforced PVC membranes seam welded by high frequency electronic machines.

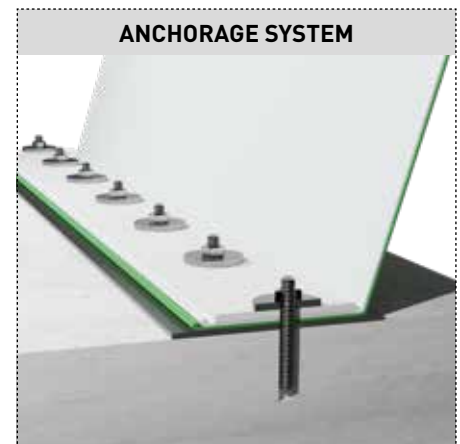
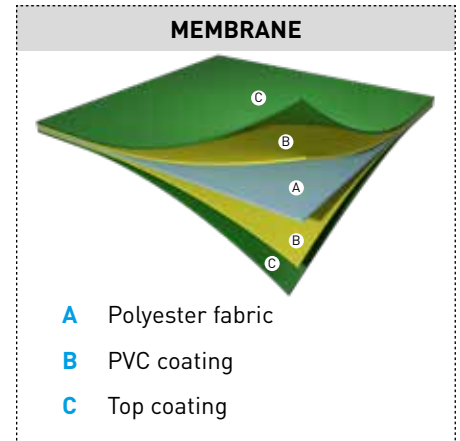
The air discharge is made with specially designed mechanic valves, while the biogas safety system (necessary in case of over-pressurization) works with liquid fuse safety valves.

An electronic sensor senses the level during the filling of the gasholder, and transmits the information to the biogas users.

The mechanical anchoring system is made directly on top of the tank wall and gas tightness can be made hydraulically with a weighed submerged membrane or mechanically with special flanges and gaskets.

The CUPOLA M3 system is resistant to strong winds, rain, and snow load.





GAS HOLDER DOME REPLACEMENT

The CUPOLA M3 domes are used to replace old steel gas holder domes, existing in present waste water treatment plants. Storage volumes can be maintained or increased and installation takes approximately one week to complete, while reducing replacement and maintenance costs.





volume level sensor

net support system

overpressure and
anti-vacuum safety valve



CUPOLA M2®

2 MEMBRANE GAS HOLDER DOME

The CUPOLA M2 domes are used in industrial and agricultural plants.

They install quickly and can be manufactured with different quality of materials and shapes to suit the needs of the customers.

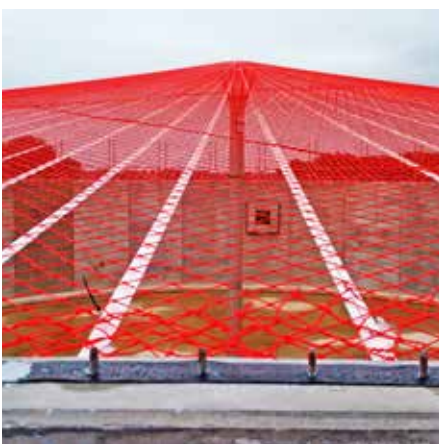
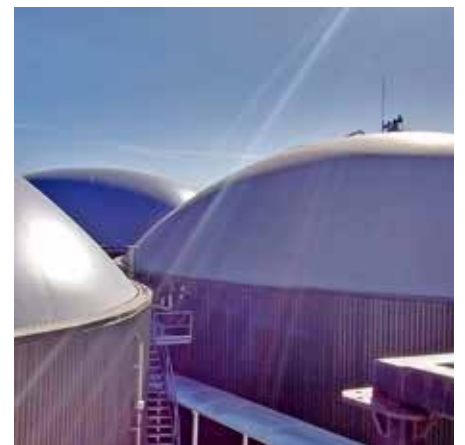
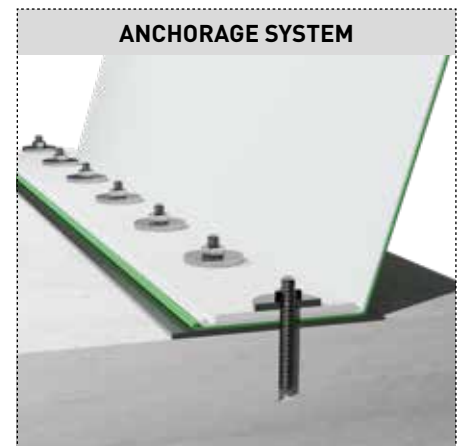
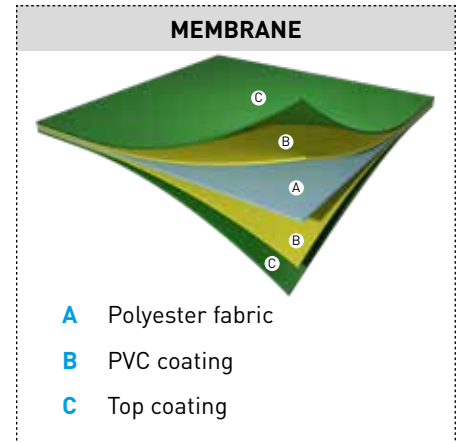
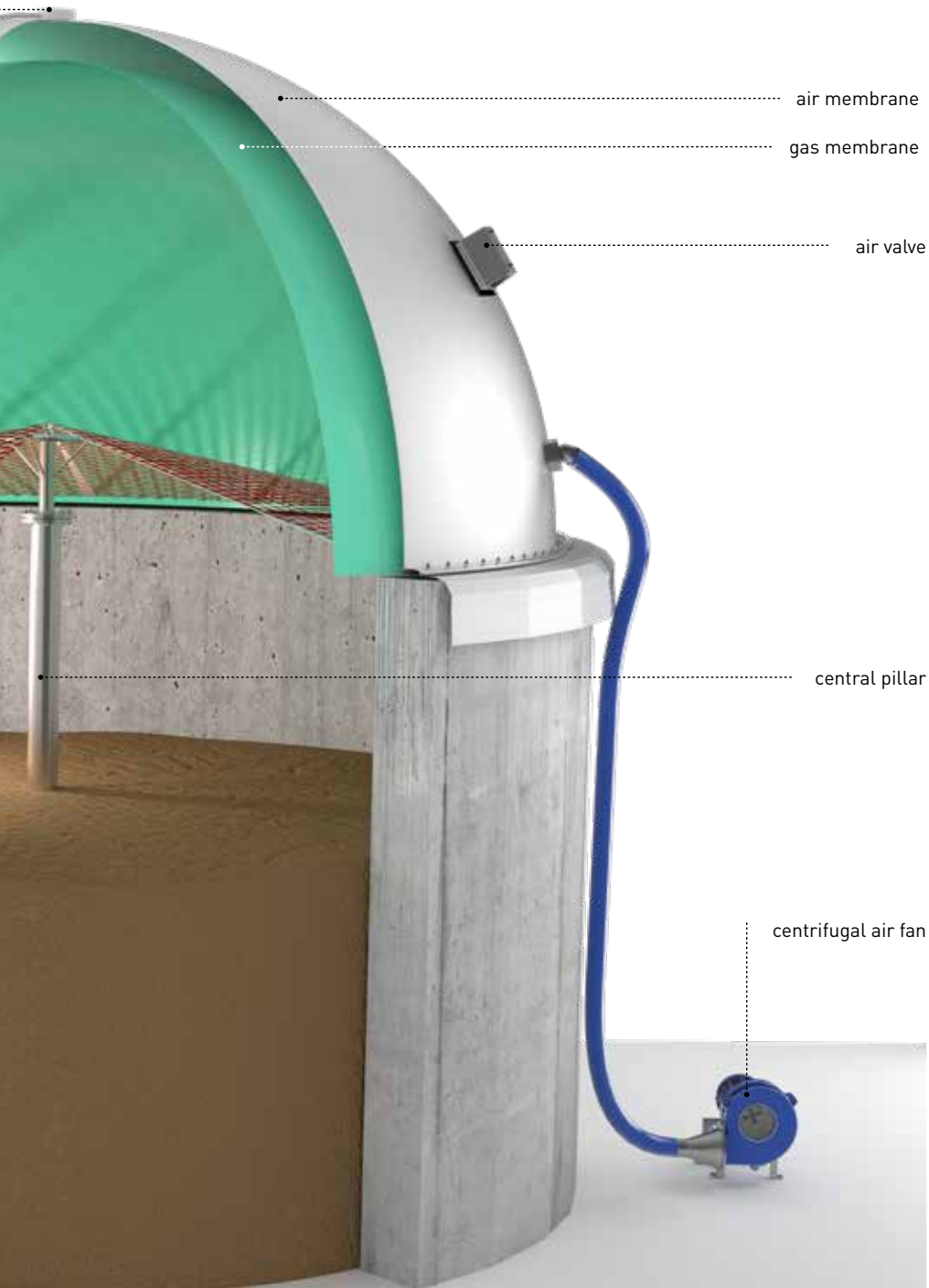
Special high pressure covers can be manufactured with reinforced membranes and oversized welding.

In agricultural biogas plants we have standardized our long tested system made with 2 membranes anchored on the tank top and stabilized at low working pressure by a ventilation system.

A support structure made with plastic ropes and a net, sustained by a central pole in steel or concrete, is positioned under the gas chamber.

The system has three main functions:

1. To keep the gas membrane from direct contact with the slurry
2. Prevent the possibility of mechanical corrosion on the mixers
3. Serve as a fundamental support structure for sulphur-fixing bacteria.





hydraulic
safety valve

gas membrane

air valve

centrifugal air fan



ECONTAINER

ECONtainer is a containerized gasholder fully assembled and tested in our company, easy to transport and to install on site without any extra testing. It is made of an internal membrane made with PVC coated polyester fabric that works as a gas storage chamber, while the external pressure air chamber is formed by the sealed steel container that comes certified for sea shipping. The gasholder comes with inlet and outlet gas connection fittings and with specific accessories for the pressurization, the gas volume level sensor and the air and gas safety valves.

MAIN FEATURES

- The gasholder can be placed on simple even surfaces without need of concrete platform.
- It is gas tight and can safely work in any wind or atmospheric extreme condition.
- It can support fast working filling cycles.
- Very easy to move and to transport.
- Easy to serial production with standard sizes.
- It can be piled up with more units connected with each other in series or in parallel without occupying any extra ground surface.



SPECIAL SHAPES

In particular cases we can realize gasholders with special shapes and working in pressure range from about zero to 70 mbar and more.



Rectangular Gasholder

This shape can suit to rectangular existing or projected areas. This design allow **high volume gas storage** in long and narrow spaces.



Other Shapes

Depending to the requests, we can realize **1, 2 or 3 membrane gasholders and gasholder domes** with different shapes.



Cylindrical Gasholder

This model is suitable for high working pressure (up to 70 mbar and more), it **requires reduced civil works and it is installable in tight spaces, in container and closed areas.**

It can be easily transported and relocated, without specific installation works.



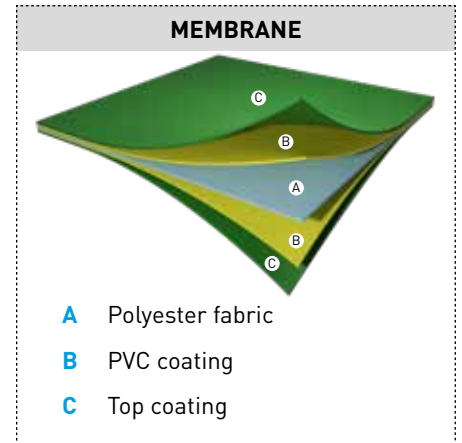


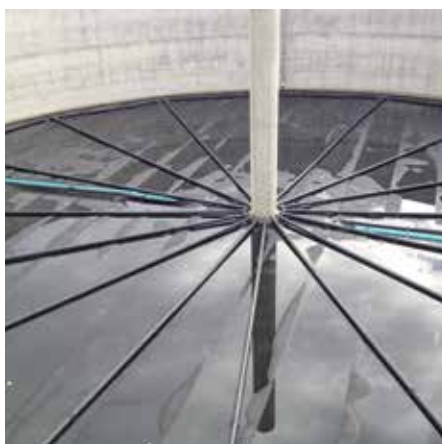
CUPOLA M1 CONE

The CUPOLA M1 CONE are suited to cover pre-tanks and post digestion tanks.

They can be designed to cover the tank for odor containment and rainfall protection or even to be gas tight and to serve as gas storage.

The conic shaped cover is supported by a central mast that ensures the required wind and snow resistance.





FLC MEMBRANE

ODOR-CONTROL COVERS

FLC MEMBRANE covers are custom designed to minimize odors and gaseous pollutants, and avoid evaporation and diffusion into the atmosphere caused by wind action.

The covers are made with flexible sheets of closed cell poly-ethylene foam that is resistant to acids and weathering.

FLC MEMBRANE covers are installed on existing and new construction tanks of any size and shape.

Their main advantage is that they mostly eliminate odors from manure storage tanks, and industrial storage plants.



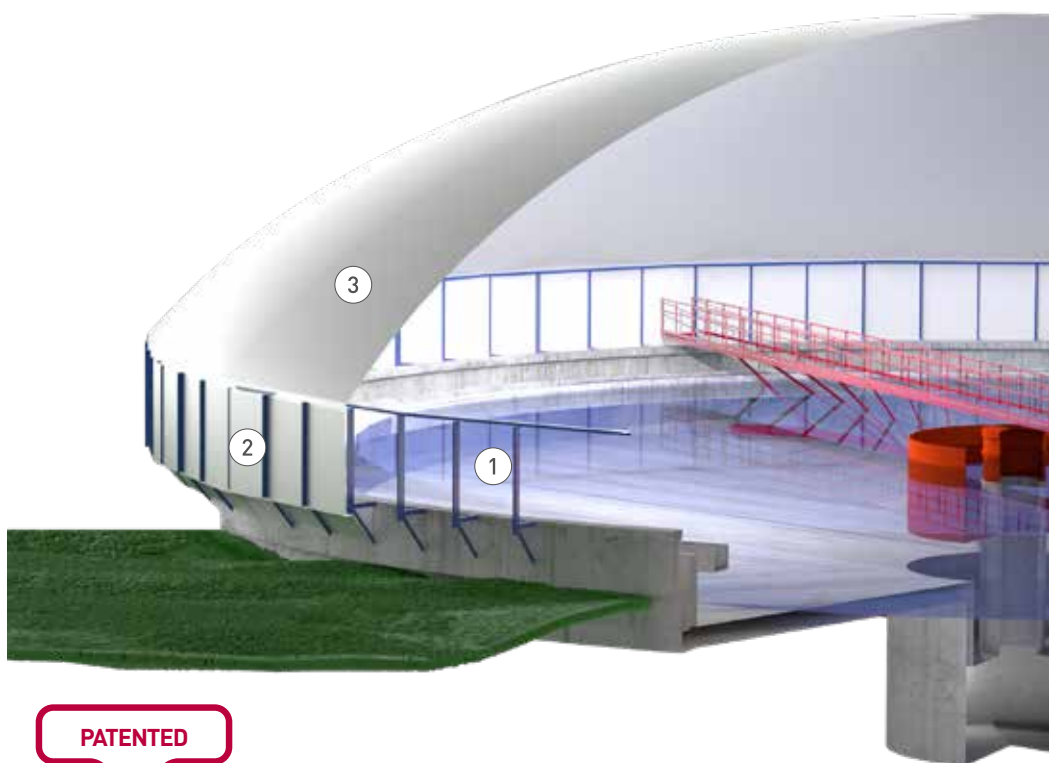
The FLC MEMBRANE covers are installed in a special way to stay constantly stretched on the surface of the slurry, even in the case of variable liquid level in the tank.

The covers capture most of the gas fumes odors by eliminating evaporation and diffusion into the atmosphere.

University research indicates that FLC MEMBRANES cut up to 98% of the ammonia gaseous emissions from slurry.

They can also be equipped with a drainage system to prevent accumulation of rainwater in the tank.





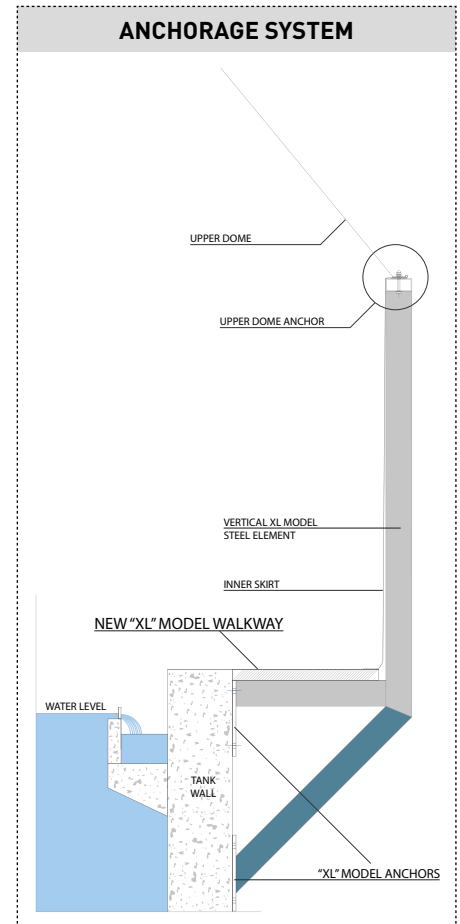
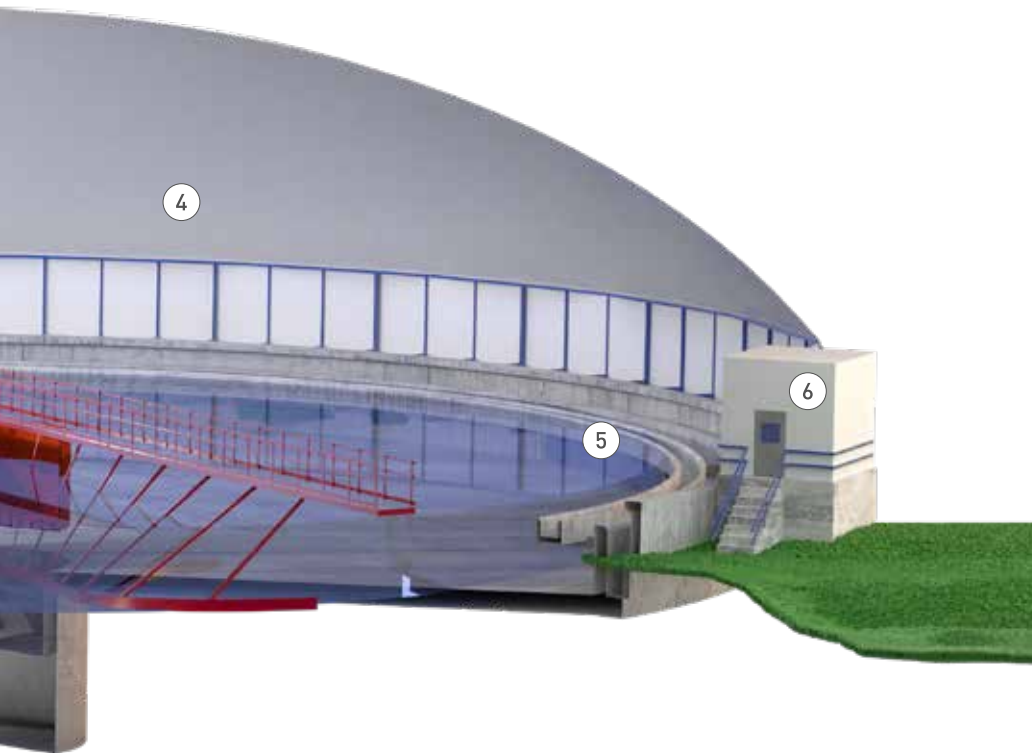
PATENTED

CLARICOVER®

CLARICOVER® is a new and unique solution to cover the primary and secondary clarifier tanks of the waste water treatment plants. It serves to cover the clarifier open tanks in order to capture and then treat the bad smelling gaseous emissions.

The CLARICOVER® system consists of the following main parts:

- ① **The Main supporting structure,** made in stainless steel profiles that have to be anchored to the existing tank external wall.
- ② **A side membrane wall made in polyester PVC coated fabric.** The scope of this part is to make air tight under pressure the support steel structure
- ③ **A pressurized pneumatic spherical cover, made in polyester PVC coated fabric membrane.** The main function of the membrane cover is to collect the bad smelling gases in order to send them to the air cleaning treatment system located downstream the cover.
- ④ **A permeable inner membrane,** located at a fixed height under the pneumatic cover. It has the scope to reduce by at least 3 times the air volume enclosed under the cover that has to be cleaned up.
- ⑤ **Air cover pressurization system,** made with redundant fresh air fans and regulation air valves that continuously replenish with fresh air the flow needed to exchange the gaseous volume enclosed between the water surface and the inner membrane.
- ⑥ **An entrance box** that works as "pressure compensation chamber" between the atmospheric outer pressure and the higher inner one



MAIN ADVANTAGES



It has an **investment cost dramatically lower** if compared with all the existing technical solutions now available (fiberglass reinforced panels, geodetic aluminum covers, etc.)



It allows to cover any round tank up to 200' in diameter as well as rectangular tanks.



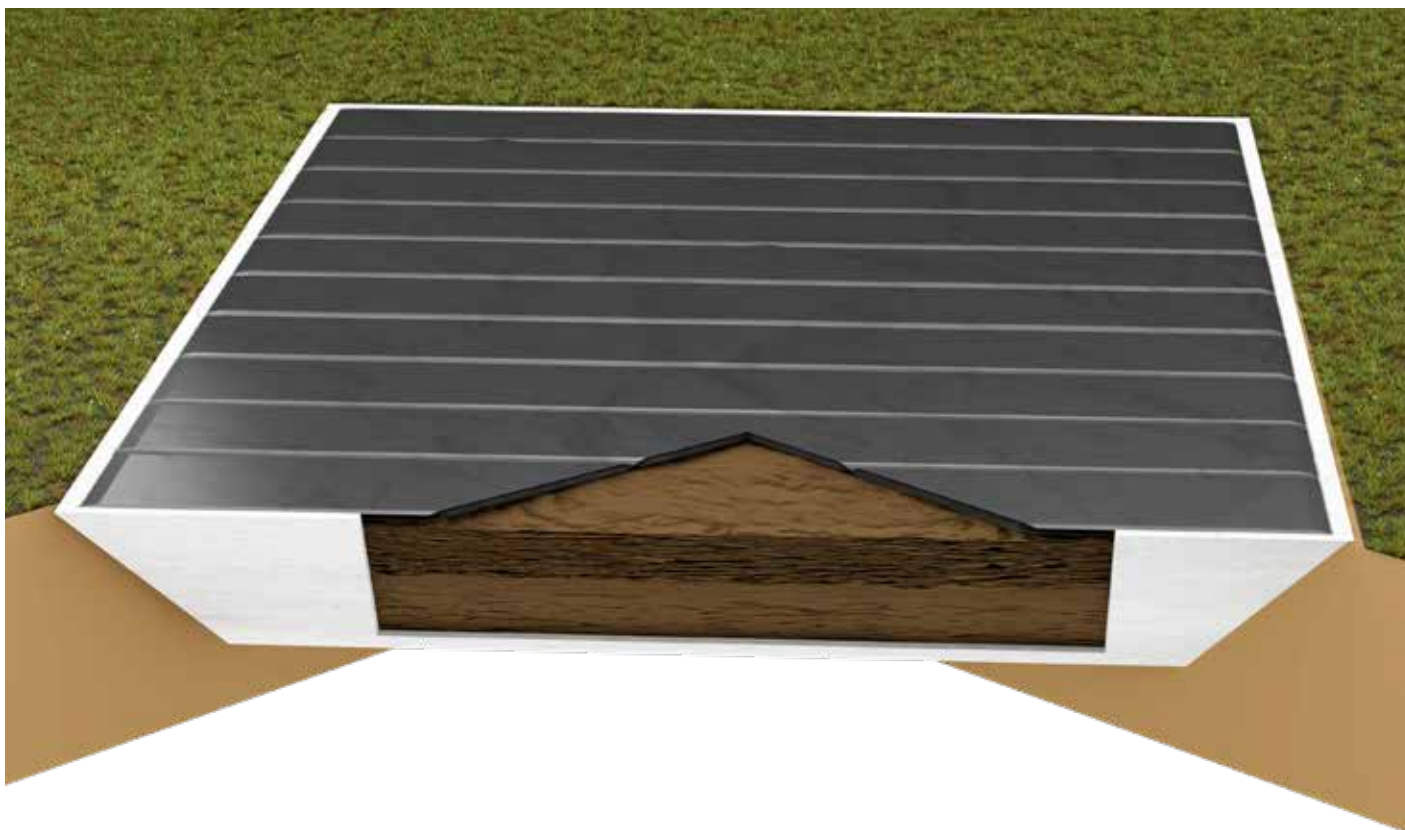
It can be **installed in few weeks** even on fully working clarifiers, with low installation costs and a light impact on the existing structures.



It reduces the air treatment needed system with the direct result of a **further cost investment reduction**.



Thanks to the big size access doors the system allows a safe and **full all around accessibility** of the tank to the maintenance personnel.



LAGOON COVER

LAGOON COVERS

The covers are tailor-made on existing or new lagoons to minimize gaseous pollutant emissions and to avoid evaporation and diffusion into the atmosphere caused by the wind.

The cover is assembled by union of parallel stripes of material with continuous high frequency welded joints. The central area of the cover floats on the liquid surface following its course. The lateral zones can be hooked to the perimeter with special connections.

MAIN FEATURES



Adaptable to docks of any size



They can be equipped with a walkable surface



They can be equipped with a system for rainwater recovery



FTD FOAM TRAP DEVICE

FTD - FOAM TRAP DEVICE

Ecomembrane's FOAM TRAP DEVICE (FTD) is designed to detect and signal the presence of foam inside the digester before it causes clogging of downstream pipelines and safety valves.

FTD's intervention allows you to have time to take the appropriate corrective action against foam generation. To optimize its effectiveness, FTD has to be installed between the digester and the drain pipe. Due to its conformation, FTD does not work as a safety valve and allows free flow of biogas without causing significant pressure load losses.

MAIN FEATURES



FTD intercepts the foam coming out the digester



It signals foam presence by means of its specific **sensor connected** to a dedicated control panel.



It **entrap**s the foam in its interior cylinder preventing it to flow into downstream pipes



It causes foam liquefaction and accumulation inside its **lower reservoir**



Permits the **elimination** of **liquefied mass** through a suitable drain pipe

ACCESSORIES

**HYDRAULIC SAFETY VALVE
WITH ANTI-VACUUM**



HYDRAULIC SAFETY VALVE



**OVERPRESSURE AND
ANTI-VACUUM SAFETY VALVE**



CENTRIFUGAL AIR FAN



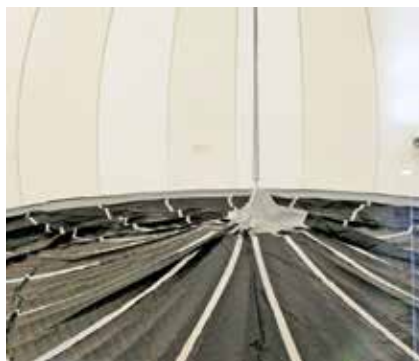
CENTRIFUGAL AIR FANS WITH ELECTRICAL PANEL



AIR VALVE



LEVEL SENSOR 4-20 mA

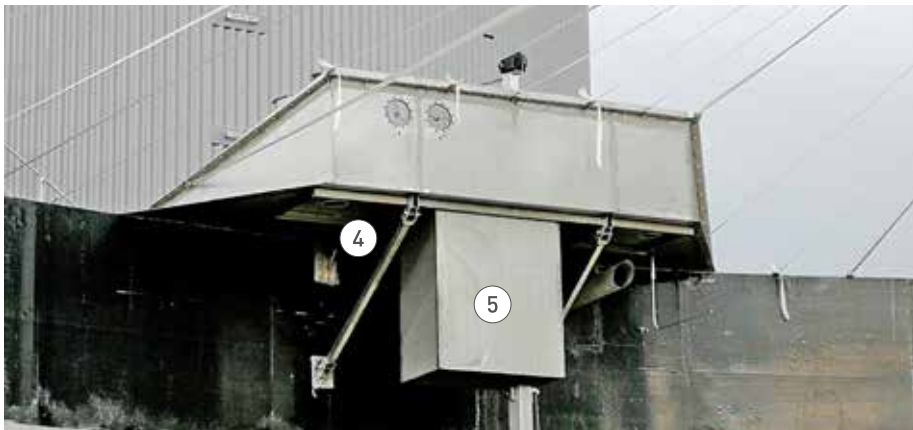


BALCONY

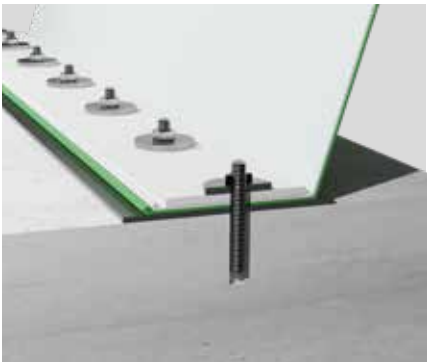


**MAIN
FEATURES**

- ① In/out gas
- ② Mixer entrance
- ③ Window
- ④ Support system
- ⑤ Stainless steel skirt gas tight



ANCHORAGE SYSTEM



2MASTER · 500m³ · Italia



2MASTER · 1.000m³ · USA



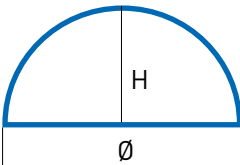
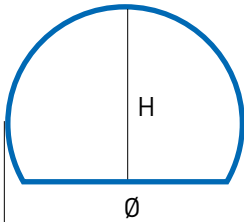
3MASTER · 4.000m³ · Corea del Sud



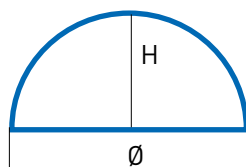
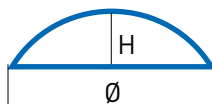
2MASTER · 16.000m³ · Turchia



GASHOLDERS

| |  | |  | |
|--------|--|-------|---|-------|
| V (m³) | Ø _{max} (m) | H (m) | Ø _{max} (m) | H (m) |
| 10 | 3,40 | 2,20 | 3,20 | 2,70 |
| 30 | 4,90 | 2,95 | 4,50 | 3,60 |
| 50 | 5,80 | 3,40 | 5,20 | 4,20 |
| 80 | 6,80 | 3,90 | 6,00 | 4,80 |
| 100 | 7,30 | 4,15 | 6,50 | 5,10 |
| 150 | 8,40 | 4,70 | 7,40 | 5,80 |
| 200 | 9,20 | 5,10 | 8,10 | 6,30 |
| 250 | 9,90 | 5,45 | 8,70 | 6,80 |
| 300 | 10,50 | 5,75 | 9,20 | 7,10 |
| 400 | 11,60 | 6,30 | 10,10 | 7,80 |
| 450 | 12,00 | 6,50 | 10,50 | 8,10 |
| 500 | 12,50 | 6,75 | 10,80 | 8,40 |
| 570 | 13,00 | 7,00 | 11,30 | 8,70 |
| 600 | 13,20 | 7,10 | 11,50 | 8,90 |
| 700 | 13,90 | 7,45 | 12,00 | 9,30 |
| 800 | 14,60 | 7,80 | 12,60 | 9,70 |
| 900 | 15,10 | 8,05 | 13,10 | 10,10 |
| 1.000 | 15,70 | 8,35 | 13,50 | 10,40 |
| 1.200 | 16,70 | 8,85 | 14,30 | 11,00 |
| 1.500 | 17,90 | 9,45 | 15,40 | 11,80 |
| 1.800 | 19,10 | 10,05 | 16,40 | 12,50 |
| 2.000 | 19,70 | 10,35 | 16,90 | 13,00 |
| 2.200 | 20,40 | 10,70 | 17,50 | 13,40 |
| 2.500 | 21,30 | 11,15 | 18,20 | 13,90 |
| 3.000 | 22,60 | 11,80 | 19,30 | 14,80 |
| 3.500 | 23,80 | 12,40 | 20,30 | 15,50 |
| 4.000 | 24,90 | 12,95 | 21,20 | 16,20 |
| 4.500 | 25,90 | 13,45 | 22,10 | 16,80 |
| 5.000 | 26,80 | 13,90 | 22,80 | 17,40 |
| 6.000 | 28,50 | 14,75 | 24,20 | 18,40 |
| 8.000 | 31,30 | 16,15 | 26,60 | 20,20 |
| 10.000 | 33,70 | 17,35 | 28,70 | 21,80 |
| 12.000 | 35,80 | 18,40 | 30,50 | 23,10 |
| 14.000 | 37,70 | 19,35 | 32,00 | 24,30 |
| 16.700 | 40,00 | 20,50 | 34,00 | 25,70 |

GASHOLDER DOMES



| Ø tank (m) | H (m) | V (m³) | H (m) | V (m³) |
|------------|-------|--------|-------|--------|
| 6,00 | 3,70 | 65 | 3,70 | 65 |
| 7,00 | 4,20 | 105 | 4,20 | 105 |
| 8,00 | 4,70 | 155 | 4,70 | 155 |
| 9,00 | 5,20 | 215 | 5,20 | 215 |
| 10,00 | 5,70 | 290 | 5,70 | 290 |
| 11,00 | 6,00 | 365 | 6,20 | 385 |
| 12,00 | 6,00 | 415 | 6,70 | 495 |
| 13,00 | 6,00 | 470 | 7,20 | 625 |
| 14,00 | 6,00 | 530 | 7,70 | 780 |
| 15,00 | 6,00 | 595 | 8,20 | 955 |
| 16,00 | 6,00 | 665 | 8,70 | 1.150 |
| 17,00 | 6,00 | 740 | 9,20 | 1.375 |
| 18,00 | 6,00 | 815 | 9,70 | 1.630 |
| 19,00 | 6,00 | 895 | 10,20 | 1.910 |
| 20,00 | 6,00 | 985 | 10,70 | 2.220 |
| 21,00 | 7,00 | 1.310 | 11,20 | 2.560 |
| 22,00 | 7,00 | 1.420 | 11,70 | 2.940 |
| 23,00 | 7,00 | 1.540 | 12,20 | 3.350 |
| 24,00 | 7,00 | 1.660 | 12,70 | 3.800 |
| 25,00 | 7,00 | 1.785 | 13,20 | 4.285 |
| 26,00 | 7,00 | 1.920 | 13,70 | 4.810 |
| 27,00 | 7,00 | 2.055 | 14,20 | 5.380 |
| 28,00 | 7,00 | 2.200 | 14,70 | 5.990 |
| 29,00 | 8,00 | 2.765 | 15,20 | 6.645 |
| 30,00 | 8,00 | 2.940 | 15,70 | 7.350 |
| 31,00 | 8,00 | 3.120 | 16,20 | 8.100 |
| 32,00 | 8,00 | 3.310 | 16,70 | 8.895 |
| 33,00 | 8,00 | 3.500 | 17,20 | 9.745 |
| 34,00 | 8,00 | 3.700 | 17,70 | 10.650 |
| 35,00 | 8,00 | 3.905 | 18,20 | 11.605 |
| 36,00 | 8,00 | 4.120 | 18,70 | 12.615 |
| 37,00 | 8,00 | 4.335 | 19,20 | 13.685 |
| 38,00 | 8,00 | 4.560 | 19,70 | 14.815 |
| 39,00 | 8,00 | 4.790 | 20,20 | 16.000 |
| 40,00 | 8,00 | 5.025 | 20,70 | 17.250 |

Cupola M3 Heat Shield - ø 22m - Italia



Cupola M2 - ø 28m - Turchia



Cupola M2 - ø 32m - UK



Cupola M2 - ø 36m - Italia





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