BIOGAS Products Ltd

Benefits of a 3 membrane half sphere gas holder

1 – Operational safety

The 3 membrane gas holder is so called because it is made up of two completely separate chambers, an air chamber and a gas chamber. This design negates any possibility of a gas leakage into an enclosed volume of air and creating an explosive atmosphere. Any gas leakage will flow naturally to atmosphere passing through the free space between the two chambers.

Gas leakage in a 2 membrane ¾ sphere design passes into the air chamber and is expected to be 'washed' out by the continual replenishing of the air chamber by the blowers.

2 – Gas holder pressure control

The 3 membrane design allows pressure to be regulated using air exhaust valves which are set to an operating pressure and mounted externally on the air chamber. When gas enters the gas chamber air is exhausted from the air chamber to maintain the operating pressure. Only when the gas is being used is there a requirement for the air blower to operate and replenish the air chamber to maintain the operating pressure.

An intermittently running 3kW blower can control a 5000m3 membrane gas holder.

The 2 membrane ¾ sphere design requires constant flushing of the air chamber by the blowers operating 24 hours a day.

Considerable electricity usage can be saved by the 3 membrane design.

3 – Power failure

The 3 membrane design enables the air chamber to retain pressure on power failure hence maintaining the structure of the gas holder long enough to allow a temporary generator connection or re establishment of mains power.

The 2 membrane ¾ shere design will immediately deflate on loss of power and on a windy day could have disastrous consequences.

4 – Gas holder shape and stability

The half spherical gas holder design provides excellent stability minimizing the required gas holder height, surface area wind exposure and hence reduced structural stresses. Deflation of the gas holder will always be contained within the anchorage ring allowing safe location of equipment local to the gas holder.

The 2 membrane design ¾ sphere by nature of the shape and extra height will be subject to higher wind loadings. Deflation of the ¾ sphere gasholder will not be constant, falling in the direction of the wind and settling outside the anchorage ring.

5 – Gas bag level sensor

Our 3 membrane design incorporates a tried and proven gas bag level control system which has been developed specifically for the application. The sensor utilizes a stainless steel chain suspended from the top of the air chamber and hangs loosely in a contained area on top of the gas bag. As the gas bag moves up and down the weight of the chain varies allowing a 4-20mA signal to be generated. The operation is simple, accurate and repeatable.

The 2 membrane ¾ sphere using ultrasonic sensors have been proven to be unreliable mainly due to the unpredictable fall of the gas bag by nature of its shape. Rope switches and low level cut outs have been added as back up to the ultrasonic sensor creating a complicated and unnecessary control system.

6 – Civil base design

The 3 membrane design and 2 separate chambers requires only a flat concrete slab at ground level with no special finishing as sealing of membranes to the concrete is not required. Above ground gas inlet/outlets can be accommodated by passing and sealing pipework through the membrane walls.

Elevated civil platforms are not required.

7 – Gas bag construction

The gas bag is manufactured as one complete welded chamber and tested at the works before dispatch to site. The gas bag is completely covered by the air chamber membrane minimizing ultraviolet exposure and does not come into contact with blower air and any oxidizing affects. These features all extend the life of the gas bag membrane.

The 2 membrane ¾ sphere design requires toleranced civil finishing and the gas seal to be made at site.

8 – Maintenance

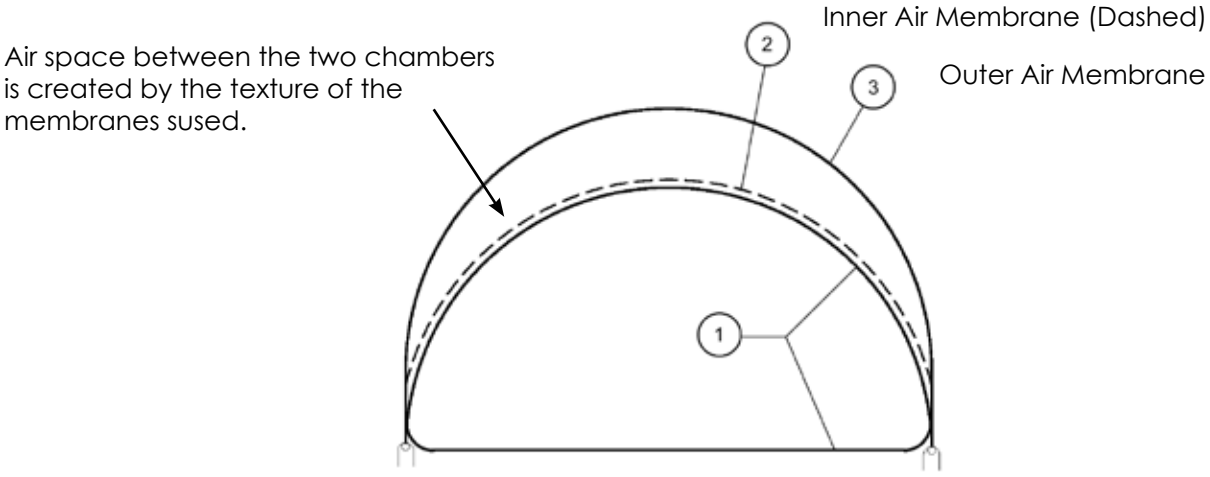
The anchoring of the bags to the concrete base is made by radial grouted stainless steel rings and horizontally placed stainless steel tubes which provide location and support for the gas and air bag fixing straps. Because there are no fixings into the concrete it is a simple procedure, taking approx 2hours, to remove, inspect and replace bags. The one piece gas bag ensures that the integrity of the gas seal is maintained.

The 2 membrane ¾ sphere design relies on the gas seal being made between the concrete and the membrane using a clamp ring and fixings into the concrete. Membrane replacements will need longer gasholder down times and the gas seal will have to be restablished and proven before bringing back on line.

9 – Static Electrical Charges

The 3 membrane design and 2 separate chambers provides a safety protection against the build up of any static charges created by the movement of air through the air chamber. Any electrical charge in the air chamber cannot pass through to the gas chamber.

The 2 membrane ¾ sphere design requires continuous blower operation with air passing constantly through the air chamber and across the gas bag membrane allowing a possibility of static build up.



The air chamber and gas chamber are two complete separately sealed membranes. In affect 2 balloons with one pushing down on the other.

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