HIDROSTANK

VACUUM FLUSHING SYSTEM

Catálogo 48.1.3i

HIDROSTANK, S.L.
Pol. Ind. La Nava C/D, N.º 15, CP 31300 Tafalla-Navarra (Spain)
Tel +34 948 74 11 10 www.hidrostank.com E-mail: info@hidrostank.com

Automatic flushing
Suitable even for large lengths and circular tanks
Maintenance without risks

One of the problems presented by storm tanks is that, after a rainy event in which the wastewater is retained inside, sedimentation occurs from part of the solids that accompany it on the surface of the retention chamber. This sedimentation can cause problems of odors and loss of healthiness in the facilities, so it is imperative to eliminate it.

The vacuum flushing system HIDROSTANK solves this problem, since it allows the automatic flushing of the retention chamber after a storm in a totally efficient way, eliminating completely the sedimentation and its associated problems.

Our vacuum flushing system uses part of the retained water for cleaning, so it is unnecessary to supply an external water source. Another added advantage is that the system is installed on the outside of the tank, facilitating maintenance work. In addition, our vacuum flushing system is able to clean chambers of high lengths and deposits of circular plant.

For these reasons, the vacuum flushing system HIDROSTANK becomes the most intelligent option when it comes to ensuring the correct cleaning of storm tanks, ensuring minimum maintenance costs and maximum safety during the same.

Figure 1: Cleaning wave generated by the vacuum system discharge.

HIDROSTANK, S.L.
Pol. Ind. La Nava C/D, N. º 15, CP 31300 Tafalla-Navarra (Spain)
Tel +34 948 74 11 10 www.hidrostank.com E-mail: info@hidrostank.com

EQUIPMENT DESCRIPTION.

Below is a diagram with the different parts that make up the equipment:

- Backboard. The equipment has 3 ball valves for each cleaning line. The filling valve is used to extract the air from the cleaning chamber. The cleaning valve serves to deflate the membrane and break the seal of the chamber for cleaning. The inflation valve is used to recirculate part of the exhaust air of the pump to inflate the membrane and seal the cleaning chamber.
- Vacuum pump. It is responsible for extracting the air from the cleaning chamber through the filling valve, causing the chamber to fill with water as the vacuum is made in it.
- Vacuum membrane. It is a flexible rubber membrane, which is inflated to seal the cleaning chamber and to make the vacuum in it. It is supported by a stainless-steel structure that has a safety valve to prevent the overflow of the cleaning chamber.
- Control panel. Its function is to govern the equipment so that it works autonomously. It receives signals from a series of sensors and with that information executes the tasks of automatic cleaning of the storm tank. It also serves to operate the equipment in manual mode.

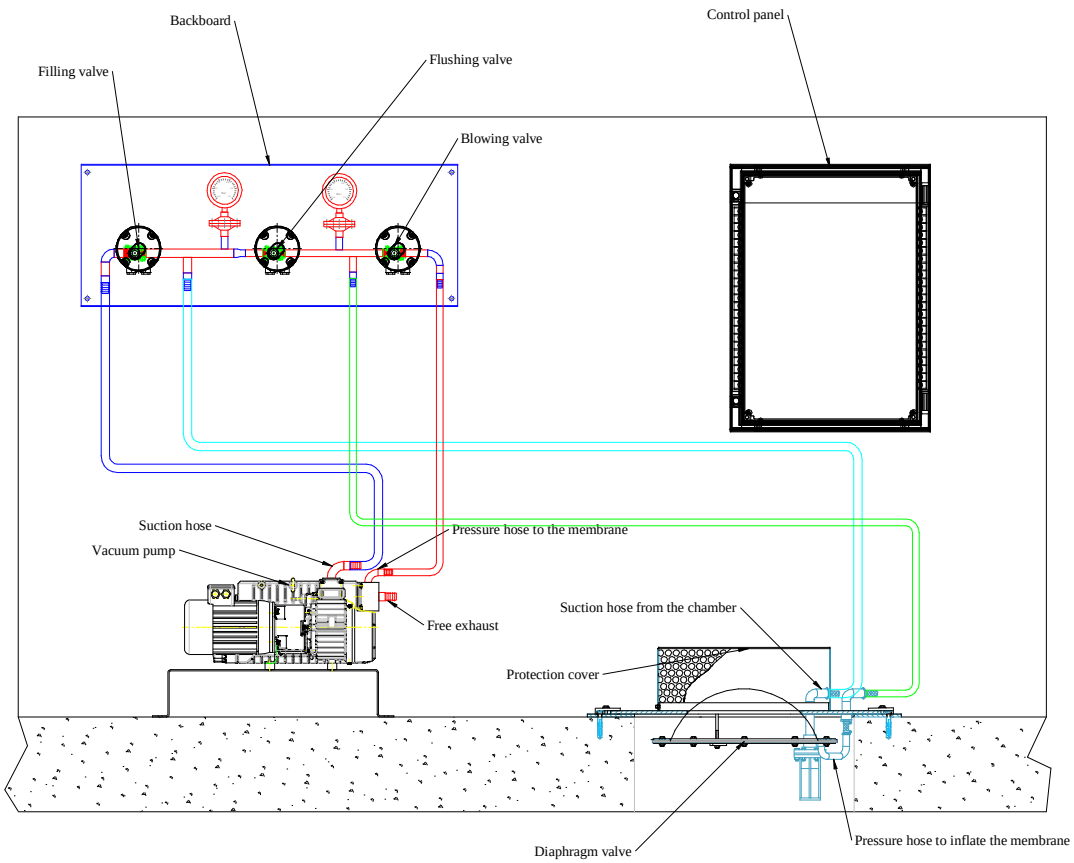


Figure 2. Schematic of the vacuum system parts.

HIDROSTANK, S.L.
Pol. Ind. La Nava C/D, N. º 15, CP 31300 Tafalla-Navarra (Spain)
Tel +34 948 74 11 10 www.hidrostank.com E-mail: info@hidrostank.com

Regarding the civil work, the system consists of the following elements:

- Cleaning chamber. It retains the water that will be used later to clean the surfce of the storm tank.
- Siphon. Through it the filling and emptying of the cleaning chamber takes place.
- Level sensors. They control the water levels in both the storm tank and the cleaning chamber. They are used for the automatic control of the cleaning system. They can be level switches, continuous sensors, etc. If a continuous level sensor is installed in the tank, for example, a radar sensor, it is used to control the minimum and maximum levels of operation.
- Sump. It is responsible for collecting the cleaning wave generated by the system, and driving said water to the outlet of the tank.

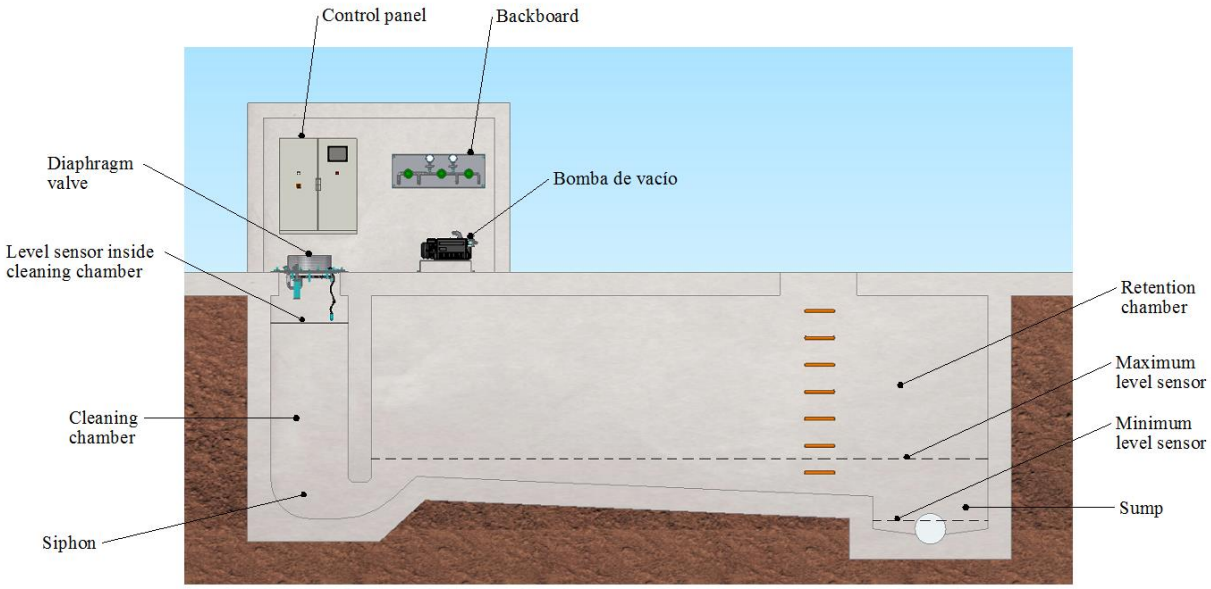


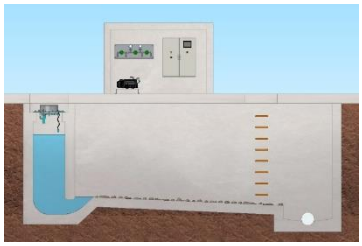
Figura 3. Esquema del sistema de vacío. Obra civil.

HIDROSTANK, S.L.
Pol. Ind. La Nava C/D, N. º 15, CP 31300 Tafalla-Navarra (Spain)
Tel +34 948 74 11 10 www.hidrostank.com E-mail: info@hidrostank.com

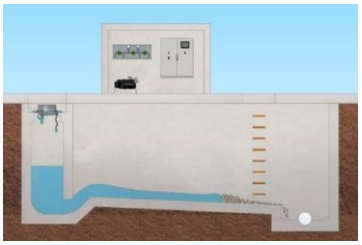
DESCRIPCIÓN DEL FUNCIONAMIENTO.

1.- The storm begins. A combination of wastewater and rain begins to fill the retention chamber, and causes the level of water in the cleaning chamber to grow. This fact is detected by a water level measurement system.

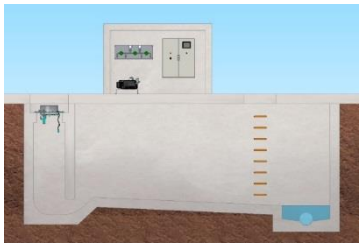
2.- After inflating the diaphragm valve, the vacuum pump automatically starts sucking air, causing water to flow from the holding chamber into the cleaning chamber due to the vacuum effect. Once the maximum level is reached in the cleaning chamber, the suction pump stops automatically.



3.- The storm ends and the retention chamber empties, leaving in it the remains of solids and other types of sediments.



4.- Once the tank has been emptied, the cleaning sequence starts automatically. The large volume of water retained in the cleaning chamber comes out of it generating an energetic wave that drags the sediments towards the outside of the tank.



5.- Once the discharge has been carried out, the collection channel must have enough capacity to collect the cleaning wave along with the sediments carried by it. Otherwise, there will be a return of the water, and the sediments will be deposited again in the surface of the storm tank.

HIDROSTANK, S.L.
Pol. Ind. La Nava C/D, N. º 15, CP 31300 Tafalla-Navarra (Spain)
Tel +34 948 74 11 10 www.hidrostank.com E-mail: info@hidrostank.com

VACUUM FLUSHING SYSTEM DESIGN

First, it is necessary to calculate the necessary capacity of the cleaning system. This capacity is directly related to the dimensions of the retention chamber (length, height and width), and with the slope of the floor. With this data, we calculate the required capacity in cubic meters per linear meter for cleaning the camera.
Depending on the width of the chamber, it is divided into one or several flushing lanes. The maximum width of each flushing lane is 10 meters.
The metal elements are constructed in AISI 304 stainless steel. Optionally they can be manufactured in stainless steel AISI 316.

INSTALLATION

1. **Civil works.** The installation of the vacuum flushing system has associated the following elements in the civil works, which are of vital importance for its proper functioning:
   - Cleaning chamber. It is the most important element, since it is essential that the camera is completely sealed, in order to make the vacuum in it and cause it to fill with water.
   - Siphon. It can be built in two variants, variant 1 being the most suitable for new construction tanks, while variant 2 is more suitable for existing tanks. In the figures, the dimensions are represented in centimeters.

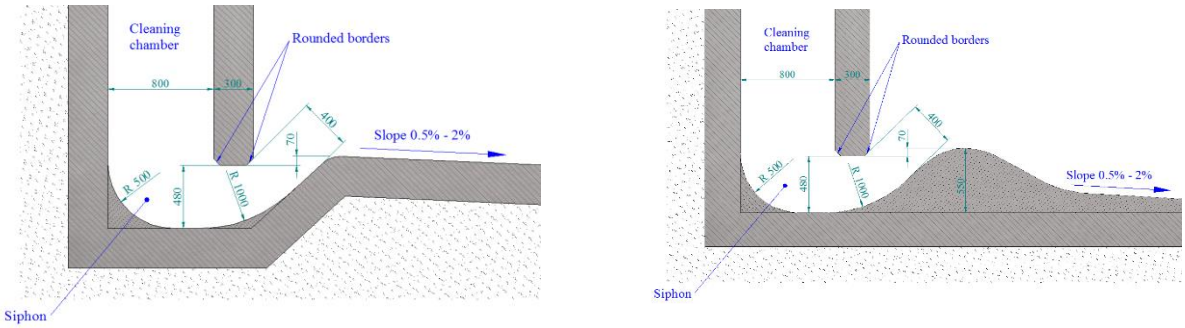
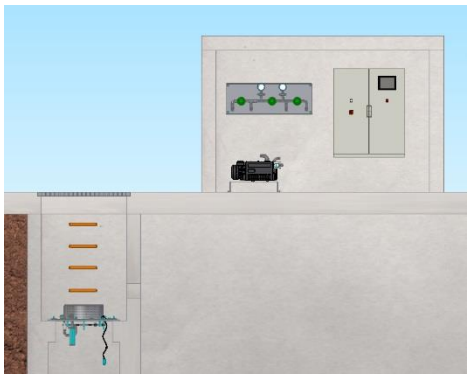


Figure 4. Variants in the construction of the siphon.

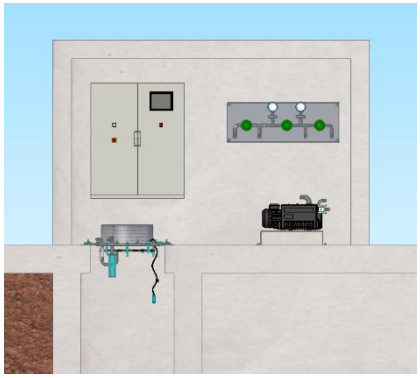
   - Water collection channel. The capacity of this channel must be at least 1.2 times the capacity of the system, to ensure that all the water in the cleaning wave is able to enter the collection channel without forming refluxes, which could cause sedimentation on the surface of the water. tank.
   - Chamber floor. It should be polished to the extent possible, to reduce friction losses in the cleaning water. In addition, the polishing helps the sediments to hold less to the surface, allowing greater ease of cleaning.
   - When the width of the retention chamber is greater than 10 meters, several cleaning lines should be formed, separating them from each other by means of low concrete walls, preferably ending in a peak to avoid deposition of solids in them. The separation walls must end one meter before reaching the collection channel, to facilitate transit through the interior of the chamber if necessary. The height of the walls is about one meter in its first two meters in length (starting from the siphon), and about 20-30 cm in the rest.

HIDROSTANK, S.L.
Pol. Ind. La Nava C/D, N. º 15, CP 31300 Tafalla-Navarra (Spain)
Tel +34 948 74 11 10 www.hidrostank.com E-mail: info@hidrostank.com

2. **Diaphragm valve.** There are two possibilities as regards the location of the diaphragm valve.
   - Diaphragm valve inside a buried box. Suitable for those places where aesthetics do not allow its surface location.



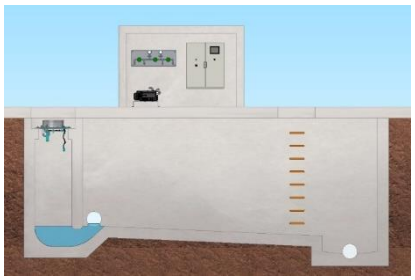
   - Surface diaphragm valve.



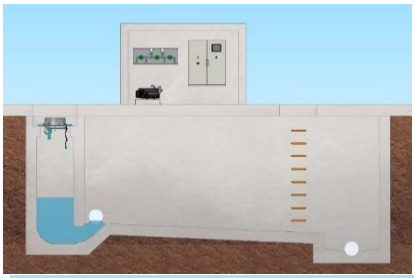
HIDROSTANK, S.L.
Pol. Ind. La Nava C/D, N. º 15, CP 31300 Tafalla-Navarra (Spain)
Tel +34 948 74 11 10 www.hidrostank.com E-mail: info@hidrostank.com

3. **Control circuit. T**he control circuit for operation is composed of the following fundamental elements:
   - Control panel. It is in charge of governing the operation of the system.
   - Vacuum pump. It is responsible for removing the air from the cleaning chamber through the diaphragm valve, through some pipes and a set of valves.
   - Level measurement system. It can be formed by two level switches or a radar level meter in the water collection channel and by a level switch or vacuum sensor in each cleaning chamber. In this way we control the water level in the tank and the filling of the vacuum chambers.

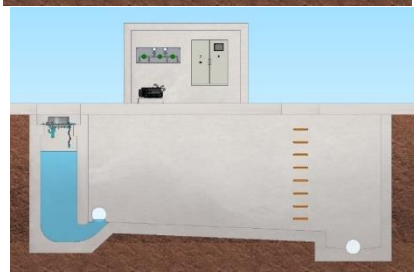
4. Accessories. As a complement, an auxiliary system for filling the vacuum chambers can be included, so that the tank can be cleaned even when there is no storm. For this it is necessary to pump water to the siphon, and activate the suction pump while swelling the diaphragm valve to cause vacuum and fill the chamber, according to the following sequence:



Step 1. Activate the vacuum pump, close the diaphragm valve and start pouring water into the siphon.



Step 2. Water continues to be poured into the siphon and activated while the vacuum is formed in the chamber, causing it to fill with water.



Step 3. Once the chamber is full, the vacuum pump stops and the supply of water to the siphon stops. The cleaning chamber is ready to perform a discharge.

In the case of several chambers, the siphons can be communicated on the outside of the vacuum chambers, and alternate filling of each one of them with a single water supply, or is provided to each siphon of your system Individual filling.

HIDROSTANK, S.L.
Pol. Ind. La Nava C/D, N. º 15, CP 31300 Tafalla-Navarra (Spain)
Tel +34 948 74 11 10 www.hidrostank.com E-mail: info@hidrostank.com

ADVANTAGES OF THE VACUUM FLUSHING SYSTEM

- Absence of submerged moving parts.
- Low maintenance costs.
- Advantages in health and safety, such as maintenance outside the tank.
- Cleaning with rainwater, mix or waste water.
- Does not need additional water supply.
- Width of the cleaning channel up to 10 m.
- Water sheet height in the cleaning chamber up to 7 m, regardless of the size of the tank.
- High cleaning capacity even with small spills.
- Reduction of investment costs and reinvestment in the equipment.
- Low energy consumption.
- Suitable for both rectangular and circular tanks.

HIDROSTANK, S.L.
Pol. Ind. La Nava C/D, N. º 15, CP 31300 Tafalla-Navarra (Spain)
Tel +34 948 74 11 10 www.hidrostank.com E-mail: info@hidrostank.com