

# **PLASMA INJECTION SYSTEMS FOR ODOR CONTROL**

## Table Content

Operation.....	3
How it Work.....	3
Decomposition of Hydrogen Sulfide.....	4
What happens to H <sub>2</sub> S after the treatment.....	4
Main Features.....	5
System Benefits.....	5
Installation in a Tank with an Aerator.....	7
References.....	8

## Operation

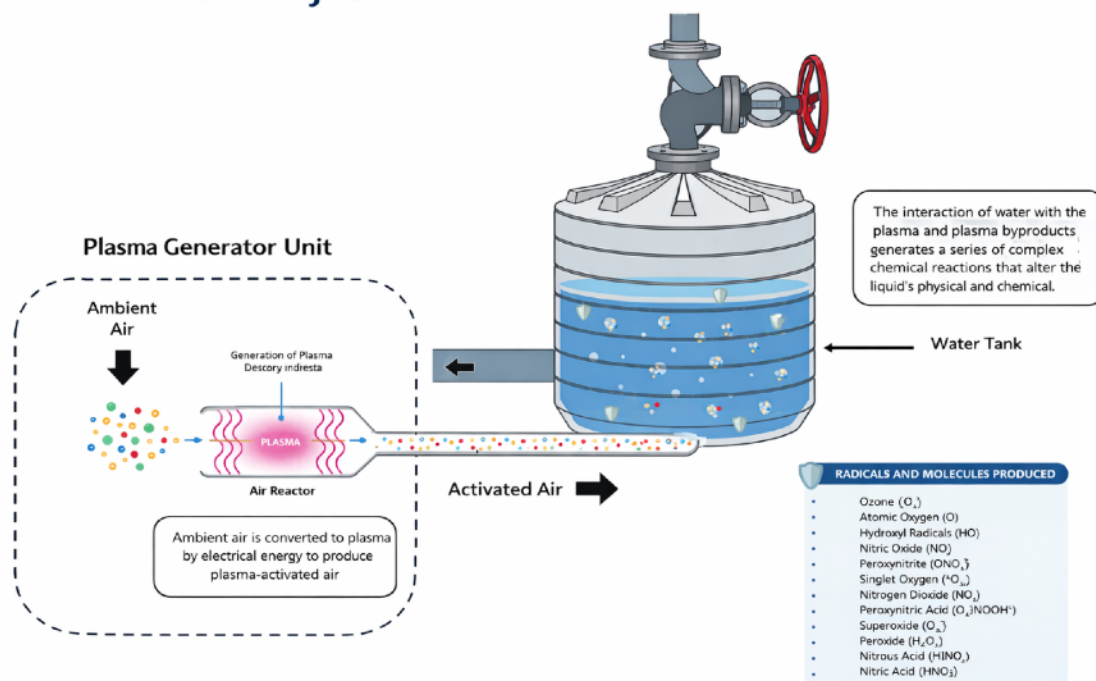
Septic tanks and wastewater generate odor mainly due to the biological and chemical processes that occur within them.

- **Decomposition of organic matter:** Produces methane and hydrogen sulfide (the characteristic rotten-egg smell).
- **Presence of bacteria:** The breakdown of organic matter generates foul-smelling gases.
- **Release of volatile compounds:** Produced by the mixture of solid waste, fats, oils, and detergents.

## How it Works

- **Gas control:** Plasma generates oxidizing agents that break down the compounds responsible for bad odors, such as hydrogen sulfide (H<sub>2</sub>S) and other volatile organic compounds (VOCs).
- **Reduction of microorganisms:** Injecting plasma-activated air into the system reduces the activity of microorganisms present in the water and promotes a more aerobic environment, which decreases the production of gases such as methane (CH<sub>4</sub>) and ammonia (NH<sub>3</sub>).

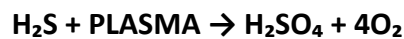
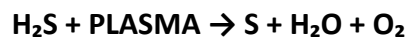
### PLASMA INJECTION SYSTEMS FOR ODOR CONTROL



## Decomposition of Hydrogen Sulfide

Hydrogen sulfide (H<sub>2</sub>S) is a gas that smells like rotten eggs and is very common in industries such as wastewater treatment, food processing plants, paper production, and industrial processes involving decomposing organic matter.

Besides being unpleasant, this gas is toxic and can cause health problems and corrosion in pipes and equipment.



Plasma-activated air is a gas with highly reactive properties, which means it breaks down and transforms H<sub>2</sub>S molecules into harmless substances. When it is applied in a treatment system, the following happens:

1. Plasma species attack the hydrogen sulfide.
2. H<sub>2</sub>S is converted into odorless substances, such as solid sulfur or sulfate.
3. The unpleasant smell disappears almost immediately.

The plasma “deactivates” H<sub>2</sub>S, eliminating its ability to smell bad.

## What happens to H<sub>2</sub>S after the treatment?

H<sub>2</sub>S can be transformed into:

- **Solid sulfur (S):** A yellow, odorless residue that can be removed easily.
- **Sulfate (SO<sub>4</sub><sup>2-</sup>):** A water-soluble compound that has no negative impact and can be drained without problems.

## Main Features

### 1. Cold Plasma Technology

- Generates reactive oxygen species and ions that eliminate foul-smelling compounds such as hydrogen sulfide (H<sub>2</sub>S), ammonia (NH<sub>3</sub>), and volatile organic compounds (VOCs).
- Produces no residues or hazardous by-products.

### 2. Compatibility with 2" Aerators

- Designed for direct connection into the air line of septic systems with mechanical aeration.
- Injection system with an optimized Venturi for improved mixing of the treated gases.

### 3. Self-Contained System and Low Energy Consumption

- 110V/220V AC power supply, with consumption below 200W.
- Automatic operation control.

### 4. Durable Housing and Easy Installation

- IP65 protection against moisture and dust; suitable for outdoor installation under a roof.

### 5. Monitoring and Safety

- Controller with automatic shutdown in case of overpressure or overheating.

## System Benefits

- Eliminates odors without the need for additional chemicals.
- Reduces the organic load by improving tank aeration.

It should be noted that the plasma aeration system removes bacteria from the water, which can be desirable in treatment plants; however, in this application it is not used at the plant stage but rather during transport, so no negative impacts on plant operation are expected.

- Easy integration with existing systems without major modifications.

## Installation Requirements

### Electrical Supply:

- Provide a 110V electrical connection at 0 meters from the system installation location.
- The electrical connection must include a dedicated 20A circuit breaker to protect the equipment.

### Physical Support:

- Provide adequate structural support for installing the IP65 cabinet, with dimensions of 40 × 22 × 32 cm and a weight of 15 kg.
- The cabinet should preferably be installed in a location protected from direct sunlight, ensuring proper ventilation for the equipment.
- The cabinet must not be placed on the ground or in areas prone to water accumulation.

### Injection System Installation:

- Install the injector inline with the blower, in series with the tank aeration system.
- The 2" Venturi injector or eductor will be provided by **PLASMA INNOVA**.
- The injector must be located downstream (after) the mechanical aeration system (blower).

### Injection Alternatives:

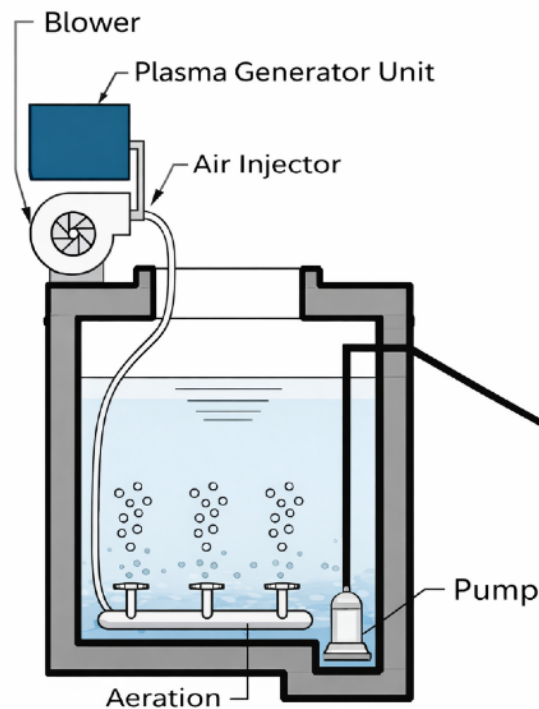
- If the blower does not allow installation of a Venturi injector or eductor, injection will be done using a Y-type injector, also provided by **PLASMA INNOVA**.
- If there is no blower, an air injection line must be available, and injection will be performed directly into the tank.

### Site Access and Conditions:

- Provide suitable access for technical staff during installation, including enough space to handle tools and equipment.
- The area must be free of explosive atmospheres or flammable materials.

## Installation in a Tank with an Aerator

The image shows a wastewater treatment system that integrates a **Plasma Generation Unit** for advanced oxidation and the removal of contaminants, including foul-smelling gases such as **hydrogen sulfide (H<sub>2</sub>S)**.



### System Operation:

1. **Oxidant Generation:**

The Plasma Generation Unit draws in ambient air and, when it is converted into plasma, transforms it into an oxidizing gas rich in active species and free radicals.

2. **Injection of Treated Air:**

The oxidant-loaded air passes through the air injector coming from the blower and is distributed through the aeration system of the wastewater tank.

3. **Contaminant Oxidation:**

As the air bubbles rise from the bottom of the tank, the oxidants react with organic compounds, hydrogen sulfide (H<sub>2</sub>S), and other contaminants present, eliminating odors.

4. nicos, sulfuro de hidrógeno (H<sub>2</sub>S) y otros contaminantes presentes, eliminando olores.

## References

**Device at Operation** – Marina Península de Papagayo, Costa Rica



**Device at Operation** – Hotel Península de Papagayo, Costa Rica





## Contact Information:

Telefono: +1(646) 784-9154 /+1(954) 553-9133

Email: [info@sfmedicalsupplies.com](mailto:info@sfmedicalsupplies.com)

Website: [www.coldplasmatechnologies.com](http://www.coldplasmatechnologies.com)

<https://www.sfmedicalsupplies.com/>