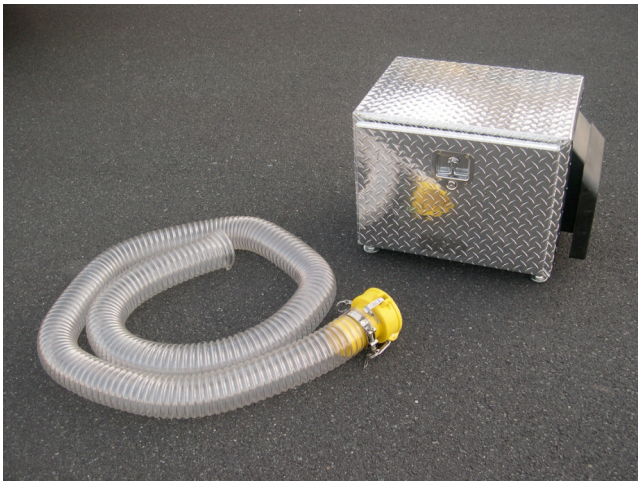
ENCHLOR INC.

GASBLASTER LSX4

OPERATION MANUAL



The treatment and transfer of wastewater produces odor emissions what are sometimes disturbing for the population living nearby a waste treatment facility or pumping station. The main sources of bad odors are sludge and its treatment as well as the collecting and primary treatment stages. The measurement of odors and the tolerance threshold of bad smells are subjective and no legislation about it has been made. Nevertheless wastewater plant managers try to limit the emission of odors. The two main sources of nauseous odors are H2S and NH3.

To aid in the removal of these odors, Enchlor Inc. has developed the Gasblaster Series of Ozone generators specifically designed to remove these odors. The Gasblaster prevents these odors from escaping the treatment or transfer chamber by injecting high concentrations of ozone into the air above the wastewater providing destruction of the offending gaseous odors and reducing them to simple compounds that simply returns to the wastewater for disinfection.

Direct Ozonation

Two methods are available to control the odors related to wastewater facilities and treatment, the simplest one is the direct ozonation. This method is suitable for small plants and can be relatively inexpensive. The alternative is washing the air with ozonized water. The method of elimination of odors by direct ozonation consists in putting in contact ozone molecules (O3) and nauseous molecules (H2S, NH3 and CH4). Those last compounds are mainly reducers whereas ozone is a strong oxidant, consequently they react so that the ozone molecule looses an oxygen atom and an oxygen molecule (O2) is released. At the same time the addition of an oxygen atom to the odorous compound provokes it to break up into smaller compounds or to transform into a stable compound. Those new molecules are not odorous.

Concerning hydrogen sulphide two ways of reaction are possible:

$H_2S + O_3 = H_2O + S + O_2$ (principal reaction)

$H_2S + O_3 = H_2O + SO_2$ (secondary reaction)

Obviously the principal reaction is environmentally more interesting since the secondary reaction releases sulphur dioxide (SO_2) that belongs to the family of sulphur oxide gases (SOx). SO_2 dissolves in water vapor to form acid, and interacts with other gases and particles in the air to form sulphates and other products that can be harmful to people and their environment.

Ammonia and methane also react with ozone and gives stable products (carbon dioxide and nitrogen gas):

$CH_4 + 4O_3 = CO_2 + 4H_2O + O_2$

$4NH_3 + 3O_3 = N_2 + 3H_2O + 3O_2$

These reactions gives water (H_2O), oxygen (O_2), carbon dioxide (CO_2) and nitrogen (N_2). There are all stable molecules and do not have harmful or nauseous effects.

Five parameters have to be taken into account in order to design a proper ozonation process:
1. Concentration of the nauseous molecules
2. Temperature and moisture
3. Type of contact between the gas and the ozone
4. Contact time between the gas and the ozone
5. Volume to be treated and flow of air

Ozonation can as well remove totally the odors as reduce them at a suitable level. Generally if the ratio ozone molecule by hydrogen sulphide molecule (O3: H2S) is comprised between 1.5 and 2, it is enough to obtain a sufficient result. Nevertheless a ratio of 2 permits to prevent from peaks.

Higher quantity of ozone can be used in case of difficult conditions (such as high temperature and high moisture content). It can also be required for highly concentrated odorous compounds, especially when treating the sludge.

The installation of the ozone generator is also important. The ozone reacts better when injected into a warm and wet medium, but its production by the generator is the best when it occurs in a dry and fresh place. Then the generator uses to be installed outside or a least not at the same place where the reaction happens.

As mentioned before the contact surface between the ozone and the nauseous gas is critical for the process. This is reinforced by the fact that the concentrations of hydrogen sulphide are only around a few ppm.

Safety Issues of high Hydrogen Sulfide Levels

Hydrogen sulfide levels are an indication of the aggressiveness of the atmosphere. This situation greatly increases the rate at which corrosion occurs inside the wet well. Severe corrosion damage can be expected at stations with high Hydrogen sulfide levels and without effective protection these stations can quickly be considered to be structurally compromised to the point where repairs are required or operator safety is compromised. This corrosion produces conditions, which are considered unsafe for manned entry into a wet well. These conditions included failed access ladders, corroded/disintegrated handrails, access platforms with missing sections of grating etc.

The Gasblaster series of control units provides valuable benefits in both odor control and a reduction in corrosion to facility equipment from the reduction and removal of H2S. For additional information and system details, please contact your local Enchlor Inc. representative.

General Ozone Information

Ozone (O3) is a colorless gas with a distinct, pungent odor. It is a molecule made up of 3 atoms of oxygen. Interestingly ozone occurs quite readily in nature, most often as a result of lightning strikes that occur during thunderstorms.

In fact that "fresh, clean, spring rain " smell that we notice after a storm most often results from natures creation of ozone. Ozone generators create ozone in your home or business ensuring the same clean air as found in nature.

Ozone is one of the most powerful disinfectants in the world, second only to Fluorine. It is three thousand times more potent than chlorine in destroying germs, bacteria, and viruses.

Benefits of Ozone Cleaning

It doesn't have as strong, or over–powering odor like Fluorine or Chlorine, yet it is so powerful, it actually kills those odors. Once generated, ozone is quite unstable, one of the three oxygen atoms eagerly splits off the molecule and attaches itself to any particle or pollutant with which it comes in contact. That single oxygen atom from the ozone air purifier proceeds to "oxidize" that particle. As a result, the particle will no longer be toxic, and will no longer be able to reproduce, if it is biological.

In other words, the toxic particle becomes completely harmless once ozone does its job.

When the single oxygen (O1) molecule oxidizes the particle, it too is destroyed.

Ozone cleaning leaves behind the O2, from which it split away, or pure and clean oxygen.

EPA / OSHA Information

The National Institute of Occupational Safety and Health (NIOSH) recommends an upper limit of 0.10 ppm for occupied spaces not to be exceeded at any time.

EPA's National Ambient Air Quality Standard for ozone is a maximum 8-hour average outdoor concentration of 0.08 ppm.

If an ozone air purifier is going to be running *while people are present*, the EPA recommends the proper settings should be selected so that the ozone level is less than 0.08 ppm.

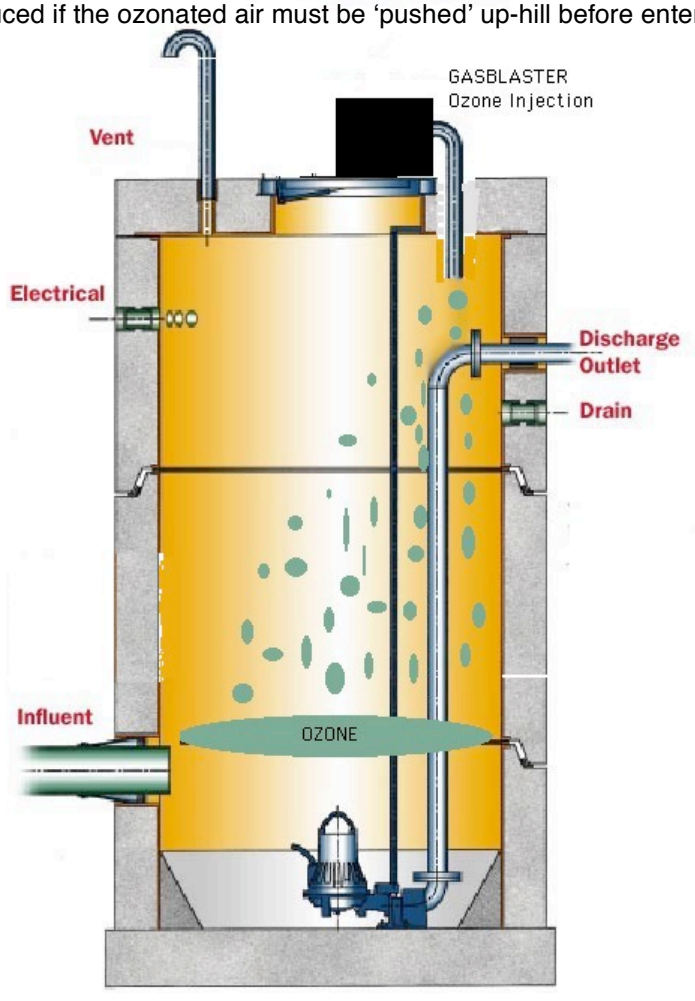
NOTE: The Gasblaster systems are designed for use in NON-OCCUPIED spaces only. If access to the lift station/wet-well chamber in required, the system must be turned-off and the chamber ventilated prior to entering.

Installation:

The Gasblaster is portable and ready to operate.

POWER: The unit is supplied with an external power cord that can be fitted with a supplied outlet connection for connection to an extension cord. Alternatively, the provided cord can be removed and the unit can be wired directly with use of standard ½" conduit connection to the rear of the unit. Electrical: 120 VA, 60hz
Fuse: Type 239, 250 volt, 3 amp

OZONE FEED: The unit is supplied with a 10' length of 2" feed tubing to deliver the ozonated airflow to the lift station chamber. The unit should be mounted as close as possible to the lift station to minimize the length of tubing required. If necessary, the tubing can be cut with a razor knife or saw. The tubing can be ducted into the chamber by many different methods. Most often, the tubing is either passed through an existing 4" or larger vent stack or connected to a piece of PVC pipe that is mounted through the lift station cover. The final discharge of the ozone flow should be approximately 24" below the cover of the station but at no time should the open end of the feed tubing be exposed to the sewage flow. The Gasblaster unit should be mounted above the lift station chamber so that the airflow from the unit is downward at all times. The efficiency of the unit is reduced if the ozonated air must be 'pushed' up-hill before entering the lift station.



OPERATION:

The Gasblaster operates by drawing in outside air through the air intake and filter system. The air then enters the EPRO-4 generator. The air is then passed over dual corona discharge generator plates. Both plates carry a high electrical charge that converts the oxygen molecules in the air from O2 oxygen to O3 ozone. The 'ozonated' air is then moved through the discharge tubing and into the lift station for oxidation of all odor-causing compounds.

After power is supplied to the unit and the discharge tube is properly installed, the unit is ready for operation. Open the enclosure door to provide access to the generator system. Make sure the generator is plugged into the internal GFI power supply outlet and the cord is properly plugged into the generator. Turn the white timer knob on the left side of the generator to the 'HOLD' position for continuous operation. Turn the large black knob on the right of the generator to increase or decrease the ozone output of the unit. Close the enclosure cover and make sure that the latch is closed securely so that the unit remains weatherproof and that all air that enters the generator passes through the intake air filters.

MAINTENANCE:

The Gasblaster LSX-4 is relatively maintenance free. The quality of air that enters the unit is directly related to the ozone output and operation life of the generator plates. The unit is equipped with an air intake filter on the inlet airside of the unit. This filter can be removed by simply pulling the element free from its Velcro mounting. The filter can be cleaned using compress air or by washing in a mild soap and water mixture and thoroughly dried before returning to use. In addition to the large intake filter, a small foam filter is located on the intake side of the generator as well. This filter should also be cleaned with mild soapy water and thoroughly dried before reinstalling.

The generator plates inside the ozone generator will require occasional cleaning. This should be performed on a 6-month basis or if a significant reduction of ozone generation is noticed. To clean the plates, please follow the following steps:

1. Unplug the generator from the GFI outlet inside the enclosure.
2. Open the two locking levers that connect the generator to the discharge coupler.
3. Remove the entire generator unit from the Gasblaster enclosure.
4. Remove the four screws that attached the outlet adaptor to the generator and remove the adaptor assembly. Make note of the location of each of the four screws. When facing the outlet adaptor, the lower right side screw is longer that the other screws. This longer screw must be re-installed in the same location. This screw is longer to provide contact with the internal safety switch. The unit will not operate without this screw and the outlet adaptor installed.
5. With the outlet adaptor removed, the two generator plates are accessible. Carefully grasp the edges of the two ceramic generator plates and slide them out towards you one at a time.
6. Wash the plates in warm soapy water using a stiff non-metallic brush to scrub the wire mesh clean. A toothbrush works well for this. Rinse the plates thoroughly. Air dry the plates or use a hair dryer. DO NOT install wet plates into the generator. This will cause arcing and damage to the unit.
7. Re-install the plates by carefully sliding them back into the slots making sure that the electrode springs are in contact with each side of each plate.
8. Replace the outlet adaptor with the four screws making sure that the longer screw is in the lower right corner.
9. Re-attach the power cord.

TROUBLESHOOTING:

Doesn't turn on:	Check that the GFI outlet is set Check that the power cord is correctly attached Check for a blown fuse
Can't smell ozone at discharge or ozone is not as strong:	Clean generator plates Replace generator plates
No or reduced airflow:	Clean air inlet filters

CAUTION: HIGH VOLTAGE POWER SUPPLY

NEVER REMOVE THE GENERATOR COVER WITHOUT FIRT UNPLUGGING THE UNIT

DO NOT OPERATE THE SYSTEM CONTINUOUSLY IN INHABITED SPACES

Although ozone is a healthful constituent of clean fresh air, high concentrations for prolonged period can produce respiratory irritation and distress. This unit is capable of producing ozone concentrations that are unsafe for occupancy when used in confined spaces. DO NOT direct the output of the system at your face for any prolonged period of time.

WARRANTY:

Enchlor Inc. Gasblaster systems are warranted to be free from defects in materials and workmanship for a period of one year from date of purchase. Enchlor Inc. may, at its option, repair or replace without charge during this period. Warranty shall be voided for unauthorized service, damage incurred as a result of negligent or improper use of the system or acts of God