



A2Z OZONE, INC.



OWNER'S MANUAL

SWIMMING POOL OZONE GENERATOR

**MODEL: SP-Series
110 or 220/240VAC 50/60Hz**

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CAUTIONS AND GENERAL NOTES

This manual covers the **SWIMMING POOL OZONE GENERATOR MODEL SP-Series** Corona Discharge (CD) Ozone Generators. A2Z Ozone Systems Inc. reserves the right to make changes to the product covered in this manual to improve performance, reliability, or manufacturability. Make sure that this manual is used with the original product it was shipped with. Although every effort has been made to ensure accuracy of the information contained in this manual, A2Z Ozone Systems assumes no responsibility for inadvertent errors.

IMPORTANT SAFETY INSTRUCTIONS

PLEASE READ AND FOLLOW ALL INSTRUCTIONS.

- Read this manual completely before attempting installation and/or operation.
- Install in accordance with the installation instructions.
- Connect to a grounded, grounding type receptacle only.

Warning - To reduce the risk of electrical shock, replace damaged electrical cable immediately.

- Follow all applicable electrical codes.
- Electric shock hazard. Be sure to turn power OFF and disconnect from power source before any Service work is performed. Failure to do so could result in serious injury or death. A licensed, qualified electrician should make all electrical connections.
- Install the ozone generator at least five feet from the water using nonmetallic plumbing.
- Install ozone check valves to prevent water from contacting the electrical equipment.
- The electrical supply for this product must include a suitably rated switch or circuit breaker to open all ungrounded supply conductors to comply with Section 422-20 of the National Electrical Code, ANSI/N FPA 70-1987. The means of disconnecting the equipment must be readily accessible to the operator(s) but installed at least five feet from the water.
- Ambient temperature around the equipment should be between 40 and 100 Deg. F (4.5 to 38 Deg. C). If the equipment is installed in an environment with temperatures over 100 Deg. F, additional air cooling must be provided. Installation without additional air cooling in an environment where temperatures exceed 100 Deg. F for any continuous 24 hour period will void the warranty.
- The system should be sized appropriately for its intended use by a qualified professional familiar with the application. The manufacturer for its intended use must validate this equipment.

Warning - Short term inhalation of high concentrations of ozone and long term inhalation of low concentrations of ozone can cause serious harmful physiological effects. **DO NOT** inhale ozone Gas produced by this device.

- For your safety, do not store or use gasoline, chemicals or other flammable liquids or vapors near this or any other appliance.
- A spontaneous and violent ignition may occur if oil, grease or greasy substances come in contact with oxygen under pressure. These substances must be kept away from oxygen regulators, cylinder valves tubing and connections, and all other oxygen equipment.

IT'S HIGHLY RECOMMENDED TO SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE!

DESCRIPTION

The **SWIMMING POOL OZONE GENERATOR MODEL SP-Series** is a compact, regulated output with Corona Discharge (CD) ozone cell with 3, 5, 8 and 16 g/hr of ozone output. The units are air-cooled, robustly built and reliable. They produce ozone concentrations between 3 to 16 g/hr. The components are made of high quality material and the controls are easy to use and view. The units feature ozone concentration knob to control ozone from 10 - 100% concentration. Use the AMP meter to see any possible defaults. Observe the Air Flow meter if venturi has enough flow to create vacuum and inject ozone into water pipe line. The Air Flow meter should be above 2 LPM for the proper amount of suction.

STANDARD FEATURES / SPECIFICATIONS

- Air Cooled, Corona Discharge Ozone Generator 3, 5, 8 and 16 g/h
- LED Status Indicators for Power and ozone outlet
- Amp meter
- Variable ozone output control (10-100%)
- LED Ozone Default warning
- Durable frame and enclosure
- Produces up to 3, 5, 8 and 16 grams per hour Ozone
- PTFE for O³ outlet
- Stainless steel fittings
- Well packaged unit



SPECIFICATIONS

SP SERIES				
Model	SP-3	SP-5	SP-8	SP-16
Ozone output g/h	3	5	8	16
Concentration g/m3	Oxygen : 25-45		Air: 5-15	
Electric	220/240 OR 110/120 VAC 50/60 Hz			
Power Watt	80	95	110	190
Size Inch	11X8X14.3		12X8X14.3	15X8X18
Weight lbs	14	14.5	16	22.5
Cooling System	Air Cooling Fan			
Gas Feed	Oxygen or Clean Dry Air			

Suggested ozone concentration and run-time in Swimming Pools

Swimming pool based on 24-hour run-time	
Pool Size in Liters, Gallon	Ozone output Generator Required
25000 L, 6600 G	3000 mg/h (3 g/h),
50000 L, 13000 G	5000 mg/h (5 g/h)
100000 L, 26000 G	8000 mg/h (8 g/h)
200000 L, 52000 G	16000 mg/h (16 g/h)
Heated swimming pools and rock pools require 10 - 15% more ozone.	
Basic conversions	
Meters (L) x Meters (W) x Meters (D) = cubic meters x 1000 = Total Liters	
Cubic Meters to Liters: Cubic Meters x 1000 = Total Liters	
Cubic Meter/3.785= Gallon	

Ideal pump run time on 24 hour cycles. If user chooses to run pump on 12-hour cycle time then water circulating rate should be once each 3 to 4 hour period. The pump should re-circulate the total volume of pool water through the injector at least once each 4 hr period for maximum liters.

If the pool volume is say 60000 liters then the pump should be capable of re-circulating the water at a rate of at least 15000 liters per hour. This way, the total volume of water through the pool will be passing through the injector at least once each 4 hour period. Less pump run time for the minimum liters. Use Sodium Bromide if additional chemicals are required. Dosage is 20 g per 1000 Liters of water every 6 months

INSTALLATION

OZONE GENERATOR PLACEMENT:

Install ozone generator in a clean, dry area with a good ventilation.

Ozone generator should be placed above any water level for the following reason; if you were to lose pressure in the venturi vacuum, gravity will cause water to travel down the ozone output tube and enter into the ozone generator. Please look at provided drawing for more information.

If water height less than 5 feet. (1.5 m)

Note:

Be sure to place ozone generator in room temperatures 40 and 100 Deg. F (4.5 to 38 Deg. C)

Select a location for the ozone generator that is as close as possible to the ozone injection point. Situate the unit in a manner suitable for convenient electrical access. The MODEL SP-SERIES enclosures is not rain proof, so it is important to choose a location that will keep the system away from direct weather and excessive heat.

The mounting holes are located on the back of the ozone generator for convenient wall mounting. Mounting hardware is not provided.

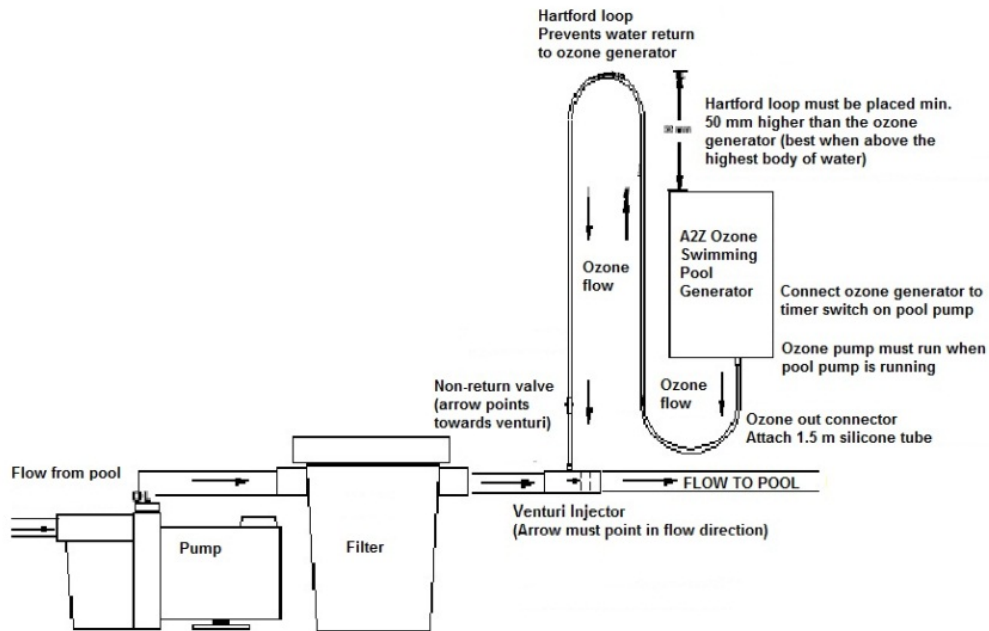
The basic installation method for the MODEL SP-Series system is INJECTOR MANIFOLD PLUMBING CONNECTIONS. INJECTOR MANIFOLD MUST BE ASSEMBLED (ordered from our site as well).



Picture of typical Venturi Injector Manifold

Refer to the 'Venturi injector Installation' diagram and follow the instructions below if the ozone is being injected directly into the full flow of the pool's return line:

- Identify the pool water supply line after the pump, filter and heater and Tap into this point. The ozone injection point should be the last component in line and as far as possible from the injection point of the residual chemical.
- Glue in the proper injector manifold, noting the direction of flow (indicated by an arrow on the injector). Once the injector is installed, the vacuum may be adjusted as described in the ozone operation Section.



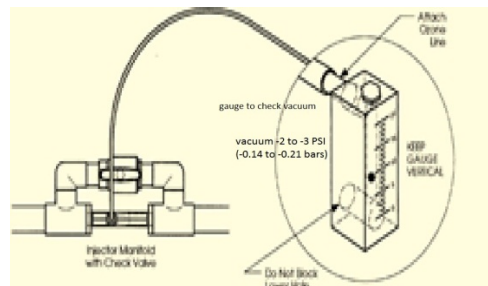
Schematic diagram of injector manifold point of installation with "Hartford loop"

DETAILS OF VENTURI INJECTOR MANIFOLD:

Attention: Install venturi with bypass valve on water recirculation pipeline. Arrow on venturi MUST be set as the same direction as water flow.

Turn water pump on and close the by-pass valve until vacuum is created at venturi input.

Note1: Use the installed flow-meter to check vacuum -2 to -3 PSI (-0.14 to -0.21 bars) or place finger over end of venturi valve to feel vacuum while adjusting the by-pass venturi valve. At this point, the air is injected into the water line; you will observe the air as bubbles in the water of the swimming pool.



MAIN POWER:

Use the power cable provided to connect the **SP-Series** to a properly rated and grounded receptacle. If the **ozone generator** will be used where water is present, a ground fault circuit interrupter must protect the circuit.

TUBE CONNECTION AND START UP:

Connect silicone tube (if you use oxygen generator or oxygen tank or external air compressor) to ozone generator (Air IN) and direct it away from hot and humid air to the ozone cell. This will serve as oxygen, or fresh air for ozone production.

Connect ozone generator PTFE tube (OZONE OUT) to venture injector manifold.

Install a check valve 10 inches after ozone out let tube fitting (even the venturi has internal check valve). You may do this by cutting tube ten inch after OZONE out fitting. Connect both ends of cut tubes to the check valve. Please direct the arrow on the check valve toward venturi. START, first the swimming pool water re-circulation pump. Make sure you have vacuum at the venturi via a gauge and test it by putting your finger on the venturi opening. You should feel a small suction, this is what is needed to get the ozone production out of the unit and inject it into the pool piping system. Check Flow meter, air flow should indicate at least 2 LPM. Now connect the PTFE tube from the venturi to the ozonator and turn on the power in the internal panel of ozone generator.

The ozone indicator light up and the fan should turn on. Increase power to the Cells by turning the ozone control knob clockwise. Please refer to the charts above for the approximate ozone concentration for your size of pool.

OZONE GENERATOR OPERATION

System Running Time

On residential pools, the ozone generator should operate for six to eight hours per day. Normally, the ozone system will run whenever the pool filtration system is operating. Since commercial pool and spa filtration systems normally operate 24 hours a day, the ozone system will run continuously on a commercial pool.

Understanding Your Water

If a high concentration of any mineral (such as calcium or iron) exists in the water, it is necessary to treat it before starting the ozone system.

Note: This should be required only when the pool is drained and refilled.

If the water is clean and clear, the ozone system may be started immediately. If the water is dirty *and* cloudy, it is recommended that it is drained and the filters thoroughly cleaned before refilling and starting the system.

Note: It is not recommended that an in-ground pool be drained in the winter or after the first rain of a season. Use a shock treatment instead of draining to avoid the possibility of severe damage resulting from "floating" the pool out of the ground.

Ozone and Bromine

Ozone has a short "half-life", which means it dissipates and re-transforms into oxygen very quickly. Therefore, a *small* residual of another disinfectant must be maintained. We recommend the use of bromine in indoor pools. Bromine residual will act as a buffer when the ozone system

is not operating. Bromine needs to be maintained at only 1.0 PPM (parts per million) so that the trace amount of the product in the water will not be noticed. Chlorine will also work as a residual oxidizer and may be used effectively in conjunction with the ozone system.

Ozone and Chlorine

For outdoor pools, we recommend the use of chlorine to supplement the ozone. Chlorine residual will act as a buffer when the ozone system is not operating. Chlorine needs to be maintained at 1.0 to 2.0 PPM (parts per million).

Water Preparation

To properly prepare the water for the ozone system, make the following adjustments and maintain the levels outlined below:

Bromine 1.0 PPM or Chlorine 1.0 to 2.0 PPM and pH 7.2 -7.6

Total Alkalinity 100-150 PPM

Calcium Hardness 200-350 PPM

Note: If any unusual reactions are experienced when ozone is introduced into the water (such as abnormal color or odor), please wait a few days to give the ozone and filter system time to work.

Algae

Always maintain the recommended residual levels of bromine or chlorine (at least 1 .0 PPM) to help control algae formation. Brushing poolside once a week is also effective, as is any algaecide.

Shock Treatment

If an unusually high bather load causes cloudiness in the water, it is recommended that a chlorine shock treatment used to assist the ozone in cleaning the water. Routine, periodic shocking is recommended to prevent buildup of organic contaminants, especially with indoor pools.

MAINTENANCE - OZONE GENERATOR

Clean the ozone generator cabinet's air filter:

This filter must be cleaned regularly. Depending on the location of the unit, it may be necessary to clean the air filter monthly. The filter elements are located on the bottom of the cabinet (see illustration below). This is the air intake element for the cooling fan and may therefore require the most frequent cleaning. The element may be cleaned with soap and water and should be dried completely before reinstalling.

Note: In a clean environment, this procedure may only need to be performed every three months.

IMPORTANT: CLEAN THIS FILTER REGULARLY! FAILURE TO DO SO WILL PROMOTE OVERHEATING AND WILL VOID THE WARRANTY!

PROCEDURE

TURN OZONE GENERATOR OFF.

CLEAN FILTER SCREEN WITH WATER AND SOAP AND DRY IT WITH A CLEAN TOWEL.

INSTALL BACK THE SCREEN.

TURN ON THE OZONE GENERATOR.

BE SURE SCREEN DOES NOT TOUCH FAN BLADE.



MAINTENANCE - SWIMMING POOL FILTER

Ozone will keep the water much cleaner than any other type of water purification system. This is due to the fact that ozone neutralizes body oils and soaps. After ozone kills the bacteria, the by-products of the process are oxygen, carbon dioxide and filterable solids. Since filterable solids are usually at higher levels than with conventional disinfection processes, the filter will have more work to do. Keeping the filter clean will make a noticeable difference in the clarity of the water. It is recommended that a regular filter cleaning schedule is established, or poor water flow through the filter will result. This will have a direct effect on the amount of ozone that enters the water.

A word of caution: There is extremely high voltage inside the ozone generator. If you suspect a problem, disconnect the power to the unit at the service disconnect box or main electrical panel and immediately contact your swimming pool maintenance technician. Inspect the ozone delivery line check valves daily for water seepage and strongly recommend replacing the injector check valve yearly.

Check valves

Two check valves are available for the ozone delivery system. One where the ozone tubing attaches to the ozone generator and one where it attaches to the injector. The purpose of

these check valves is to prevent water from backing up into the ozone generator. The PTFE ozone delivery line(s) should be inspected daily to insure water is not flowing back into the ozone generator. Check valves should be replaced yearly. Note: The only time it is possible for water to flow back toward the ozone generator is during a system shutdown. Always inspect for water seepage during this time.

Fuses:

Fuse is located on the panel at the bottom of the unit. The fuse is 3 AMP for SP-3 to SP-8 and 6 AMP for SP-16.

TROUBLESHOOTING

The test method for failure of the ozone generator:

Check the power input for correct voltage (110V OR 220V).

Unit is on but no ozone; this is due to over heating or water back flow to the ozone generator.

Turn off ozone generator and let air flow through the unit for 1 to 2 hours to dry the ozone tube.

Check main fuse, change if needed. It is a **3 AMP for SP-3 to SP-8 and 6 AMP for SP-16** fuse.

Check the tubing inside the machine for kinks.

If the machine can produce some air, but the air is not ozone; please check the following:

- A. The power indication lamp is lit.
- B. Check ozone control knob is set above zero.
- C. Check ozone board fuse, 3 AMP.
- D. Check wire from terminal to ozone board.
- E. Check Pot wire is connected to ozone board.

If you are still experiencing problems, please contact A2Z Ozone Systems for more information.

HEALTH HAZARDS OF OZONE

Do not allow the ozone gas level in any living area to exceed FDA-recommended level of 70 PPB.

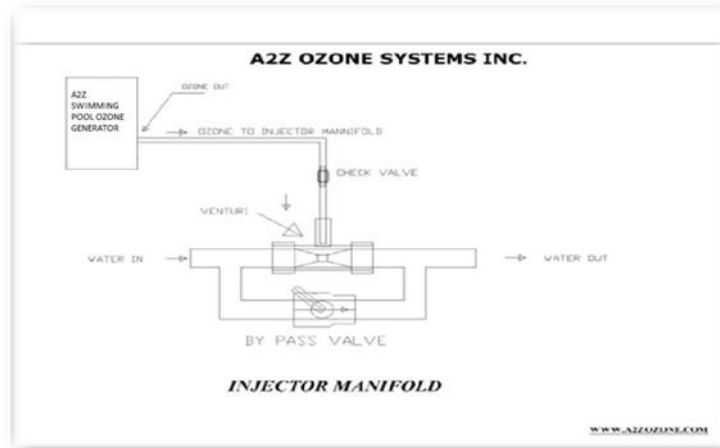
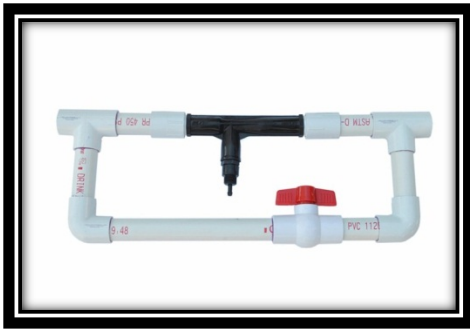
WARNING: Long term inhalation of high concentrations of ozone gas in the air can cause nasal and/or lung irritation. When using this unit for air treatment purposes, it is recommended that it be operated in unoccupied spaces.

Detection Levels in Air

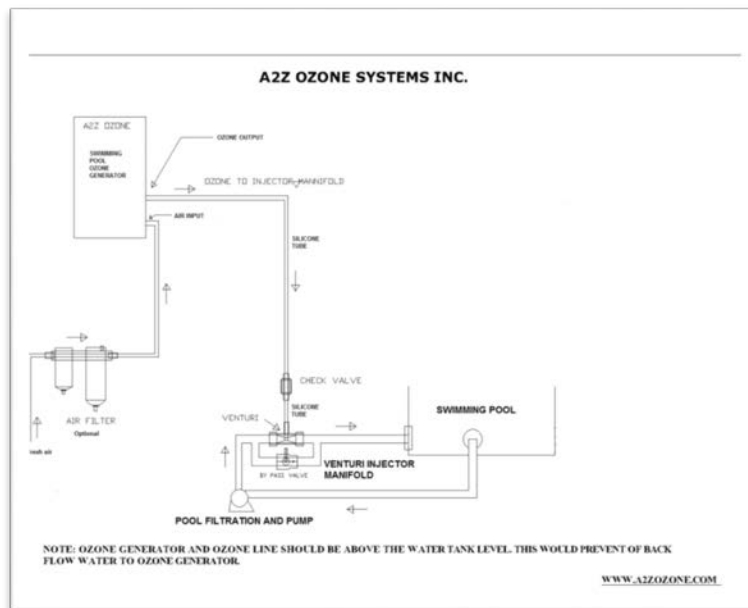
Ozone gas can be detected in air by its distinctive odor at concentrations of about 0.02 ppm. Although each nose varies, "olfactory fatigue" occurs quickly. As a result, DO NOT RELY ON ODOR AS A WARNING OF HIGH OZONE CONCENTRATIONS. The permissible exposure level (PEL) or time weighted concentration for ozone gas to which workers may be exposed is 0.1 ppm averaged over 8 hours, 5 days a week (OSHA). The short term exposure limit is 0.3 ppm average over 15 minutes. The concentration of 10 ppm ozone gas in air is generally accepted as immediately Dangerous to Life or Health (DLH).

SAMPLE SCHEMATIC DIAGRAMS

Swimming Pool Venturi Injector Manifold:



SAMPLE SCHEMATIC DIAGRAM



CORONA DISCHARGE (CD) OZONE SYSTEMS

Ozone is manufactured in the CD ozone generator by drawing in air, which is composed of 20% oxygen (O_2), and exposing it to multiple high voltage electric0). The ozone is drawn into the water by a venturi injector/mixer, killing any bacteria, viruses or mold spores it contacts. Ozone is generated on-site, eliminating the need to store toxic and corrosive chemicals. The corona discharge method is the most efficient way to produce large amounts of ozone.

A2Z Ozone Systems, Inc. manufactures high output corona discharge systems capable of producing enough ozone to substantially reduce the consumption of other chemical disinfectants. This reduction will make the water crystal clear and rainwater soft while allowing for cost savings on chemicals and maintenance. Also, important health advantages will be realized, including no hair discoloration, excessive skin dryness, faded swimming apparel, or irritation to the eyes, nasal passages and throat. Ozone reacts to waterborne contaminants significantly faster than other disinfectants and the primary by-product is pure oxygen.

A2Z Ozone Systems, Inc. ozone systems are built with the finest components available. All are air-cooled and use a venturi injector system to create the best possible contact and mixing of ozone while maintaining a high level of safety.

In contrast to ultraviolet ozone generators, corona discharge systems produce a much higher concentration of ozone and in much larger quantities. In addition, the annual expense of replacing lamps and checking ballasts is unnecessary with corona discharge systems. Corona discharge ozone generation is the most economical and effective method to use on large, commercial water applications.

FAQ's: OZONE SWIMMING POOLS / SPA BATHS

1) What is ozone?

Ozone is a highly reactive and unstable form of oxygen. Ozone is made up of three oxygen atoms together, written as O_3 . It is called activated tri-atomic oxygen. It is a gas and is denser than air. Ozone is the second most powerful sterilizer in the world and its function is to destroy bacteria, viruses and odors. Ozone is nature's way of purifying the air we breathe. It is the distinctive "electric" odor smelled during and after thunderstorms. Ozone derives from the Greek word ozein, which means to smell. If natural ozone ceased to exist, life on this planet would also cease to exist.

2) Is ozone a new technology?

Ozone has been around as long as oxygen, sunshine and lightning. It was discovered and isolated in 1840 by Christian. F. Schoenbein who noticed a unique odor during electrical sparking and electrolysis experiments. He realized that the odor was the same one he observed after a lightning flash. In 1886 de Meritens of France conducted the first experiments using this unique gas as a disinfectant. He proved that even minute amounts of ozonized air would sterilize

polluted water. A few years later in 1891, the German scientist Froelich reported the bactericidal properties of ozone from pilot plant tests conducted at a drinking water treatment plant in Martinkendorf, Germany. In 1893, the first drinking water treatment plant to employ ozone was built in Oudshoorn in the Netherlands. In 1906, the first large-scale water treatment facility built specifically to use ozone as a disinfectant was completed. By 1977, there were 1039 ozone drinking water treatment plants in Europe. Today there are thousands water treatment plants worldwide using ozone. Ozone has been used in swimming pools and spas in France, Germany, Netherlands, and other European countries since the early 1950's and in the United States since about 1975.

3) How is Ozone Produced?

Ozone can be produced artificially according the same principle as it occurs in nature, which means by UV light (ozone layer) or via Corona-Discharge (CD) high voltages, thunderstorm. In both methods the connection between the oxygen molecules is broken up. Consequently oxygen radicals are produced, which connect with the oxygen molecule to O^3 (ozone). For the production of ozone, corona discharge is used more because of the greater advantages of this method. Advantages are the lower costs for ozone production (more cost-efficient) and the greater durability of the system. For the feed inlet ambient air can be used as well as pure oxygen. For pure oxygen, oxygen generators can be used to concentrate oxygen out of air. When pure oxygen is used a higher concentration of ozone can be produced.

4) How does ozone work?

Ozone operates according to the principle of oxidation. Ozone is faster than chlorine at killing bacteria because chlorine needs to diffuse through the cell wall and disrupt the bacteria's metabolism. Ozone, however, rips open the cell wall from the outside, causing the cell's contents to fall apart. This process is called cell lysing. With ozone, after destruction of the cell, all that is left is carbon dioxide, cell debris and water. As the ozone oxidizes material, it gets used up. Once it has done its job of oxidation, ozone reverts back to oxygen (O^2). This additional oxygen in the water makes it taste good, smell good and gives it a sparkle. There are no toxic or hazardous byproducts.

5) What will Ozone Destroy?

Ozone kills bacteria, viruses, spores, mold, mildew, fungi, amoeba and cysts. Various factors play a role in effectiveness of ozone in the removal of contaminants, such as the amount of ozone, the concentration of ozone, and the contact time of ozone with the organism. Ozone will not usually eliminate all algae and hence an additional sanitizer must be added to the water to kill algae and provide protection during the time the ozone generator is not on.

6) Is Ozone an Oxidizer?

The easy answer is yes. Ozone oxidizes at a rate of nearly 3000 times that of chlorine, and is twice as powerful. Ozone will also oxidize metals such as iron and manganese, as well as the bonds of many color-producing contaminants like decaying leaves and grass. Once the bond is broken, the color disappears.

7) What are the benefits of using ozone?

- Bacteria kill rate is up to three thousand times faster
- 50% stronger oxidizer than chlorine
- Reduces traditional chemical use between 60% - 95%
- Reduce handling and storage of unsafe chemicals
- Reduce constant purchasing of harmful chemicals
- Eliminate red, irritated eyes and dry, itchy skin
- Eliminate costly replacement of faded swimwear
- Remove unpleasant chlorine / chloramine odors
- No adverse health or environmental effects
- Improvement of the filter and coagulant capacities = reduction of coagulant use & less water backwashing
- Water consumption can be decreased, because of an increase in water quality

8) Can I stop using Bromine?

You will definitely reduce your chemical usage in your pool up to 95% depending on weather conditions and pool characteristics. Ozone provides better water quality and oxidizes many contaminants that bromine cannot. However, Ozone only lasts in pool water for a short period of time (15-30 minutes) therefore in order to provide lasting protection during times when ozone is not being injected, to control algae and to oxidize ammonia and swimmer waste, you must maintain a small residual of bromine (1.0 to 2.0 ppm of bromine) in the water. The longer the ozone system operates the less bromine you will have to use to maintain water quality. Ozone will kill algae at the point of injection, not algae that are growing on the pool walls. Recommended Dosage for Sodium Bromide is 20g per 1000 Liters of water every 6 months.

9) How does ozone get into the water?

Ozone is a gas and it is only slightly soluble in water. It must be thoroughly dissolved in water so that the chemical reactions with contaminants can take place. The most common way in swimming pools is with a venturi injector, which is a device a 100mm in length with each end the same diameter (40/50mm) as the pool plumbing line. A section of pool piping is removed, and a venturi injector is installed. The injector's diameter is smaller in the middle, similar to squeezing or pinching a hose. The water travelling into the injector begins to move faster. In the middle of the injector there is a small hole. As water is pumped through the plumbing and past the hole, a vacuum is created. The amount of vacuum is dependent on the amount of water flow through the injector – more water equals more vacuum. If a small flexible hose or tube is attached to this small hole, a liquid or gas can be drawn into the injector and mixed into the water. The goal is to make the smallest bubbles possible and to keep the bubbles in contact with the water for as long as possible. The ozone that does not get dissolved will kill or oxidize anything in the water.

10) How long will ozone last in my pool?

For the purification of water and air, it's needed to produce ozone on-site. Because of its short half-life, ozone will decay soon when produced. The half-life of ozone in water is about 30 minutes, which means that every half hour the ozone concentration will be reduced to half its initial concentration. For example, when you have 8 g/l, the concentration reduces every 30 minutes as follows: 8; 4; 2; 1; etc. In practice the half-life is shorter because a lot of factors can

influence the half-life. Factors are temperature, pH, concentration and sort solutes. Because ozone reacts with all kinds of components, the concentration of ozone will reduce quickly. When most of the components are oxidized, the residual ozone will remain, and the concentration of ozone will reduce.

11) Will the temperature or humidity of the air or water affect ozone?

The temperature and humidity of the air will directly impact on the concentration of ozone gas produced. The more humid and the hotter the air, the less concentrated the ozone produced will be. Likewise the temperature of the water has a similar effect; the cooler the water the ozone is injected into, the more effective the ozone will be at removing contaminants! Heated pools require 10-15% more ozone than traditional pools.

12) Is ozone safe?

Ozone has been documented for over a century now, so quite a lot is known about it. OSHA - Occupational Safety and Health Agency has stipulated that the safe allowable level of residual ozone is 0.08 ppm. This is supposedly based upon the historical safety of ozone. Note that this permissible level is for continuous exposure throughout an entire 8 hour day for 5 days a week. No Federal or State agency can agree on what the maximum level of ozone exposure should be, so there is no standardization in maximum permissible ozone levels. That signifies these numbers are arbitrary, meaning they are not really sure of what a maximum sustainable ozone level should be. Since excess ozone gives off an unmistakable strong "bleach like" odor, one always know if too much is present in the air. In other words before ozone could possibly have any unsafe effects, a person would be greatly offended by its bleach like odor. Ozone is safe to use in occupied areas because we notice its unpleasant odor at very low levels and then have the ability to turn it down. Ozone generators, when used correctly will not exceed government guidelines for continuous safe exposure. Precautions should be taken, however, because the nose can lose its ability to sense the ozone after a sustained period of time. If one senses a headache or sore throat it may mean the ozone level is too high. The fact remains if the ozone level is much higher than is recommended to be considered safe, it would become so pungent that anyone could sense it. Ozone does this by becoming so offensive at high levels that we would not be able to stay in the environment for more than a very short period. This is much like what would happen if we entered a smoke filled room. No one has ever claimed a worker's related illness resulting from ozone exposure

13) Is ozone safe for my pool equipment?

Most pool systems these days come supplied with plumbing that is ozone-resistant, example PVC piping. However, Ozone gas can corrode metal and other materials such as nylon and rubber. Care must be taken to check that all plumbing and piping between the injection point (Venturi Injector) and the point of entry to the pool are made of ozone-resistant materials. All our ozone generators are supplied with ozone-resistant accessories

14) Is ozone safe for swimmers?

Ozone dissolved in the water is pH neutral so the pH will not harm equipment or people. The amount of ozone added to the water is enough to kill bacteria, virus, cysts, mold and spores, but is safe and non-toxic to humans and pets - no red, irritated eyes and dry, itchy skin. When

properly installed and plumbed all of the ozone generated will be dissolved in the water or used up oxidizing impurities in your water.

15) Does ozone affect water balance?

Ozone has a neutral pH (about 7.0) so it does not affect pH. Ozone has no calcium, no alkalinity, and no dissolved solids. Therefore, ozone does not affect water balance. It does remove trace amounts of metals such as iron or copper by oxidizing them to their highest oxidation state. They will then precipitate out of the water and be trapped by your filter.

16) Can I run my pump and filter for fewer hours?

Ozone is only injected into your water when the pump is running. The longer you run the ozone generator (and your pump and filter), the better your resultant water quality will be and thereby reducing the need for residual chemicals. During summer / swimming season you should run your ozone generator, pump and filter a minimum of 12 hours each day. We recommend that you run your pump for 24hrs a day in summer. Up to 80% of the water treatment is done by your filter, so don't be afraid to use it. The extra electricity cost will be compensated by the savings on costly chemicals.

17) Will there be a visible change to my water?

Yes! When ozone is first introduced into your pool water and during the first 72 hours, your pool water may get cloudy. Ozone will begin to oxidize all of those particles and metals that your present sanitizer would otherwise leave in your pool. When these particles are oxidized, they form visible particles that are heavier than water and precipitate. Also, there will be pieces or fragments of the cells that ozone has destroyed. So the cloudiness that you may see is oxidized material, pieces and fragments of cells, and metal precipitates. Some of the dirt and debris in the water is too small to be trapped by the filter. These small-sized dirt particles have a weak electrical charge or pole. Because all the dirt particles have a negative charge, they repel each other like two magnets. They are so small that they are not affected by gravity and therefore won't settle out either. Ozone neutralizes these charges, which allows the particles to combine into large enough particles to be trapped by the filter. Once these particles are oxidized, neutralized and filtered, the water will have a definite "clarity and sparkle" that you may not have experienced before. In addition, after the ozone does its work, it reverts back to oxygen. This added oxygen will make the water look, feel and even taste better.

18) How should I prepare my pool before I install an ozone generator?

- Backwash Pool
- Adjust total alkalinity with Hydrochloric acid or Sodium Bicarbonate 80-100ppm
- Adjust pH 7.2 to 7.8 (HCL acid to lower and Sodium Bicarbonate to increase)
- Shock treat with Hydrogen Peroxide 35% (100mL / 1000 Liters pool water)
- Ozone is used as primary Sanitizer and Sodium Bromide as secondary / residual Sanitizer
- Sodium Bromide should test between 1-2 ppm (Dosage: 20g per 1000 Liters of water every 6 months)

19) What special swimming pool maintenance ozone systems require?

- Shock treat with Hydrogen peroxide
- Maintain total alkalinity with Hydrochloric acid or Sodium Bicarbonate 80-100ppm
- Maintain pH 7.2 to 7.8 (HCL acid to lower and Sodium Bicarbonate to increase)
- Shock treat with Hydrogen Peroxide 35% (100mL / 1000 Liters pool water)
- Keep pool clear of leaves and debris
- Check and clean basket daily. Backwash regularly.
- Use Algaecide if required – consult supplier for ozone compatible type

20) What special maintenance does the ozone generator system require?

- Check Non-return valve for signs of water returning into the tube to the ozone generator - replace if necessary.
- Check the silicone tube for deterioration - replace if necessary
- Check unit internal air filter for blockage
- Check that small, fine bubbles are coming from pool return jet
- Make sure no debris or dirt is blocking fan guards
- Use the fingertip test on the air inlet port to the ozone generator to check that suction is still present and Venturi injector is working correctly

21) How do I know if there is enough ozone for proper sanitation?

This can be a difficult question to answer. Experts have not been able to develop a minimum or maximum level for ozone in swimming pool water because of the multiple variables involved such as air temperature, water temperature, humidity and bather load. Pool owners who have been using chlorine or bromine for a few seasons know how much sanitizer they use in a season or year. Installing an ozone generator in these pools has resulted in a significant reduction in the amount of chemical sanitizer used. The longer the ozone operates each day, the greater the reduction in chemical sanitizers. Pool owners have had reductions in sanitizer use of 50 to 90%. Your savings may vary based on pool usage factors. Ozone is not sold on the basis of being less expensive than other sanitizers such as chlorine and bromine are. Its value is in smoothness and sparkles to the pool water, elimination of the dry, itchy skin that chemicals can produce burning red eyes and bleached bathing suits. Other important advantages include reduced pool maintenance and reduced exposure to toxic chemicals in storing, handling and swimming.

22) Will my ozone generator help the ozone layer?

Ozone from a swimming pool ozone system will not add anything to the atmosphere or the ozone layer. When injected into the water properly, no ozone escapes into the atmosphere. Even if it does get into our atmosphere, it is like a drop in the ocean. Also, the ozone would have to be transported 9 to 18 miles up. The ozone layer that you may have heard about is a layer of mostly oxygen and ozone that is located in the lower stratosphere between altitudes of 9 and 18 miles. The ozone results almost entirely from oxygen (O_2) splitting apart into two atoms of oxygen (O^2) by solar ultraviolet radiation (the sun's UV rays) and then combining with molecular oxygen (O_2) to form ozone (O_3). Atmospheric ozone plays a critical role for the earth by absorbing the ultraviolet radiation from the sun with a wavelength of between 240 and 320 nanometers (nm), which would otherwise be transmitted to the Earth's surface. This radiation is responsible for sunburn to human skin. In addition, the incidence of skin cancer has been statistically correlated with UV light intensities of 290 to 320 nm.

A2Z Ozone Systems Inc. - ONE YEAR LIMITED WARRANTY

The limited warranty set forth below applies to products manufactured by A2Z Ozone Systems Inc. - and sold by A2Z Ozone Systems or its authorized dealers. This limited warranty is given only to the first retail purchaser of such products and is not transferable to any subsequent owners or purchasers of such products. A2Z Ozone warrants that it or its authorized dealers will repair or replace, at its option, any part of such products proven to be defective in materials or workmanship within ONE (1) year from the date of retail purchase of such products. (All parts) ANY REPAIR OR REPLACEMENT WILL BE WARRANTED ONLY FOR THE BALANCE OF THE ORIGINAL WARRANTY PERIOD. NOTE: USE ONLY A2Z Ozone AUTHORIZED REPLACEMENT PARTS. USE OF ANY OTHER PART(S) WILL AUTOMATICALLY VOID THIS WARRANTY. THIS LIMITED WARRANTY DOES NOT INCLUDE ANY OF THE FOLLOWING:

- (a) Any labor charges for troubleshooting, removal, or installation of such parts;
- (b) any repair or replacement of such parts necessitated by faulty installation, improper maintenance, improper operation, misuse, abuse, negligence, accident, fire, repair material, and/or unauthorized accessories;
- (c) Any such products installed without regard to required local codes and accepted trade practices;
- (d) ANY IMPLIED WARRANTY OF MERCHANTABILITY OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE, AND SUCH WARRANTIES ARE HEREBY DISCLAIMED: AND
- (e) A2Z Ozone SHALL NOT BE LIABLE UNDER ANY CIRCUMSTANCES FOR LOSS OF USE OF SUCH PRODUCTS, LOST PROFITS, DIRECT DAMAGES, INDIRECT DAMAGES, CONSEQUENTIAL DAMAGES AND/OR INCIDENTAL DAMAGES.

TO OBTAIN WARRANTY SERVICE

Contact A2Z Ozone, 1844 Cargo Court Louisville, KY 40299, USA

Customer Service Number: +1 502-499-4977.

When filing a claim, you must provide:

- 1) Your name, mailing address and telephone number
- 2) The selling dealer's name
- 3) Proof of date of purchase
- 4) The date of failure
- 5) A description of the failure.

After this information is provided, A2Z Ozone will release a RETURN GOODS AUTHORIZATION (RAN) NUMBER. After receiving the RAN number the part in question must be returned to A2Z Ozone, freight prepaid, with the RAN number clearly marked on the outside of the package. All preauthorized defective parts must be returned to A2Z Ozone within thirty (30) days. Under no circumstances may any product be returned to A2Z Ozone without prior authorization. You must call or write prior to returning product or your returned goods shipment will be refused. Upon receipt of preauthorized returned goods, A2Z Ozone will repair or replace, at its option, the defective product(s) and return them freight (prepaid for products under warranty). Buyer's acceptance of the product and use thereof constitutes acceptance of these terms.

A2Z Ozone WARRANTY REGISTRATION CARD

This information can be also send by EMAIL to us. Please provide ALL pertinent information and send within twenty (20) days to: service@a2zozone.com

Otherwise, please fill out completely and return to A2Z Ozone by post within twenty (20) days of purchase.

Customer Info:

Name _____
Address _____
City _____ State _____ Zip _____
Phone (____) _____

Dealer Info:

Dealer Name _____
Dealer Address _____
City _____ State _____ Zip _____
Phone () _____

Purchase/Product Info:

Purchased Date: _____ Date Installed _____
Product Purchased: **SWIMMING POOL A2Z S-SERIES OZONE GENERATOR**

Comments / Questions:

DO NOT FORGET TO CUT OUT, PLACE IN ENVELOPE AND MAIL TO THE FOLLOWING ADDRESS FOR INSTANT WARRANTY COVERAGE!

A2Z Ozone Systems Inc.
ATTN: Warranty Dept.
1844 Cargo Court
Louisville, KY 40299, USA

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