How does an ozone system work?

The expensive, cumbersome ozone systems of the past have given way to smaller, modern systems that provide public pools a viable water quality solution at an affordable cost. Today's commercial ozone systems are simple, compact and efficient. Many are skid-mounted with flange-to-flange hook-ups for easy installation as a partial wall-mount or floor-mount. An ozone disinfection system consists of two basic components that ensure optimum performance at the lowest operating cost:

- Ozone generation system: manufactures ozone gas
- Ozone management system: efficiently dissolves the gas into the water while preventing off-gas of undissolved ozone

The ozone management system maintains appropriate ozone levels in the water regulated with an ORP controller/monitor. These components operate in unison and are easily installed to an existing public pool as a side stream to the pool's main filtration system. Ozone is introduced to the water after filtration (and heating) and before the chlorine feeder. The side-stream flow is normally 15 to 25 percent of the main flow, depending on the size and type of pool. The system output is increased as the water quantity or organic loading increases. When sized and applied in compliance with the *MAHC*, the broad-spectrum oxidation of an ozone system offers significant benefits:

- Ozone destroys substances chlorine can't effectively eliminate, like human fluids, cosmetics and organics of all kinds.
- Ozone controls the chloramine levels in the water to 0.2 ppm or less.
- Ozone can eliminate shocking for chloramine reduction.
- Ozone offers significantly more oxidation than free available chlorine (FAC) alone.
- Ozone produces a minimum three-log (99.9 percent) kill of *Cryptosporidium parvum* and other RWI pathogens in a side-stream-applied single pass.
- Ozone provides micro-flocculation to aid filtration and improve water clarity.
- Ozone reduces the amount of chlorine usage required to maintain a FAC residual.

Table 1. Ozone's efficacy on common microorganisms found in public pools at the lowest ozone dose in a side-stream applied single pass

E. coli	4.7 log (99.99%)
Staphylococcus aureus	4.7 log (99.99%)
Trichophyton mentagrophytes	4.0 log (99.99%)
Candida albicans	4.7 log (99.99%)
Pseudomonas aeruginosa	6.6 log (99.9999%)
Enterococcus faecium	6.7 log (99.9999%)
Cryptosporidium parvum	3.0 log (99.9%)

Data derived from *NSF Standard 50, ANNEX H* and *NSF Protocol P308* testing at NSF Labs.

How does ozone compare to UV?

While two completely different technologies, there remains confusion about the difference between an ozone system and a UV system. The difference between the two systems essentially is: UV kills germs with light energy, whereas ozone kills germs as an oxidizer.

Ozone gas dissolves in water to kill microorganisms, destroys organics that create chloramines and breaks down existing chloramines by oxidation. This oxidation happens immediately at the ozone gas injection point and continues as the side stream

Table 2. Ozone versus UV comparison chart

Ozone	UV
Ozone kills *Cryptosporidium parvum*	UV inactivates *Cryptosporidium parvum*
Ozone kills microorganisms	UV inactivates microorganisms
Ozone is a powerful oxidizer	UV is not an oxidizer
Ozone passes into the pool at low levels to provide additional oxidation	UV affects the water only as it passes through the UV chamber
Ozone functions well in cloudy water and is a mircro-flocculent, which aids water clarification	Only clear water can be effectively dosed with UV; cloudiness in the water can absorb the UV light
Ozone oxidizes the organics and inorganics that created chloramines, eliminating their production	UV breaks down chloramines that have been previously created
Ozone utilizes ORP (REDOX) to measure the cleanliness of the water	UV systems utilize a UV intensity meter, which measures the UV dose, regardless of water quality
Ozone's reaction with free available chlorine (FAC) is very slow and in a pool will not affect the FAC levels; only chloramine destruction	UV can break down free available chlorine in the water, while it breaks down chloramines
Ozone cells require no replacement; require annual periodic cleaning; no hazardous components	Mercury vapor lamps are replaced at three to twelve months; disposal procedures must be considered as lamp gases are considered hazardous waste
Ozone destroys biofilm	UV does not affect biofim
Ozone destroys humic and fulvic acids	UV does not affect humic and fulvic acids