



OZONE TECHNOLOGY

HYGIENE CONTROL
FOOD AND BEVERAGE



OZONE THE NATURAL CHOICE FOR FOOD HYGIENE CONTROL



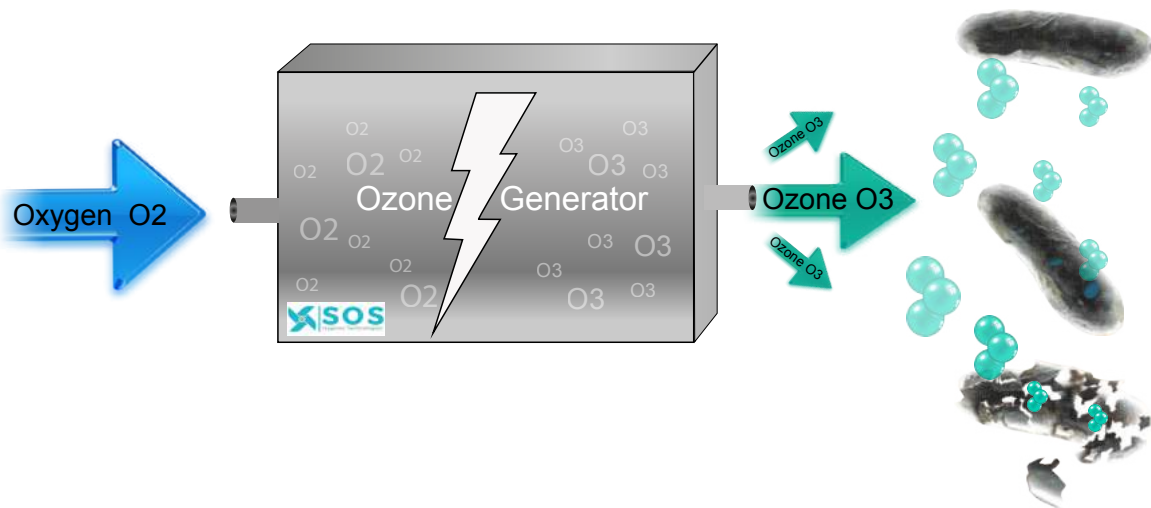
To meet retailer, customer and consumer expectations, there are increasing demands in the food industry for higher standards of control of microorganisms in the food production environment. This requirement for further reduction of pathogens has led to a significant interest in the use of ozone technology as a supplement to routine hygiene and disinfection.

Ozone

Ozone is created from air. Ozone is a highly reactive gas which is produced when the oxygen in the air interacts with either electricity or UV light. It is also known as “activated” oxygen and is an extremely powerful and effective natural cleansing agent.

How Ozone works

Ozone is one of the most powerful oxidising agents available and bacterial death is rapid. This is due to ozones cell lysing potential. Ozone is effective in wet and dry environments and is the ideal technology platform for sanitisation and disinfection across the entire range of applications and challenges facing the food industry today. The correct application of ozone significantly reduces the risk of food poisoning.



Benefits of Ozone

- Destroys bacteria on food and protects at all stages from farm to fork.
- Ozone is effective on all orientations and destroys pathogens in areas where traditional disinfectants are unable to reach.
- Ozone is effective in dry (Gas phase) and wet (Aqueous phase) environments.
- Ozone is not subject to Maximum Residue Levels (MRLs).
- Ozone reduces the need for harsh chemicals, the handling and storage of chemicals and removes the consumable cost of chemicals.
- Ozone can help reduce product fails and recalls, which mitigates the risk of damage to the company brand and reputation.

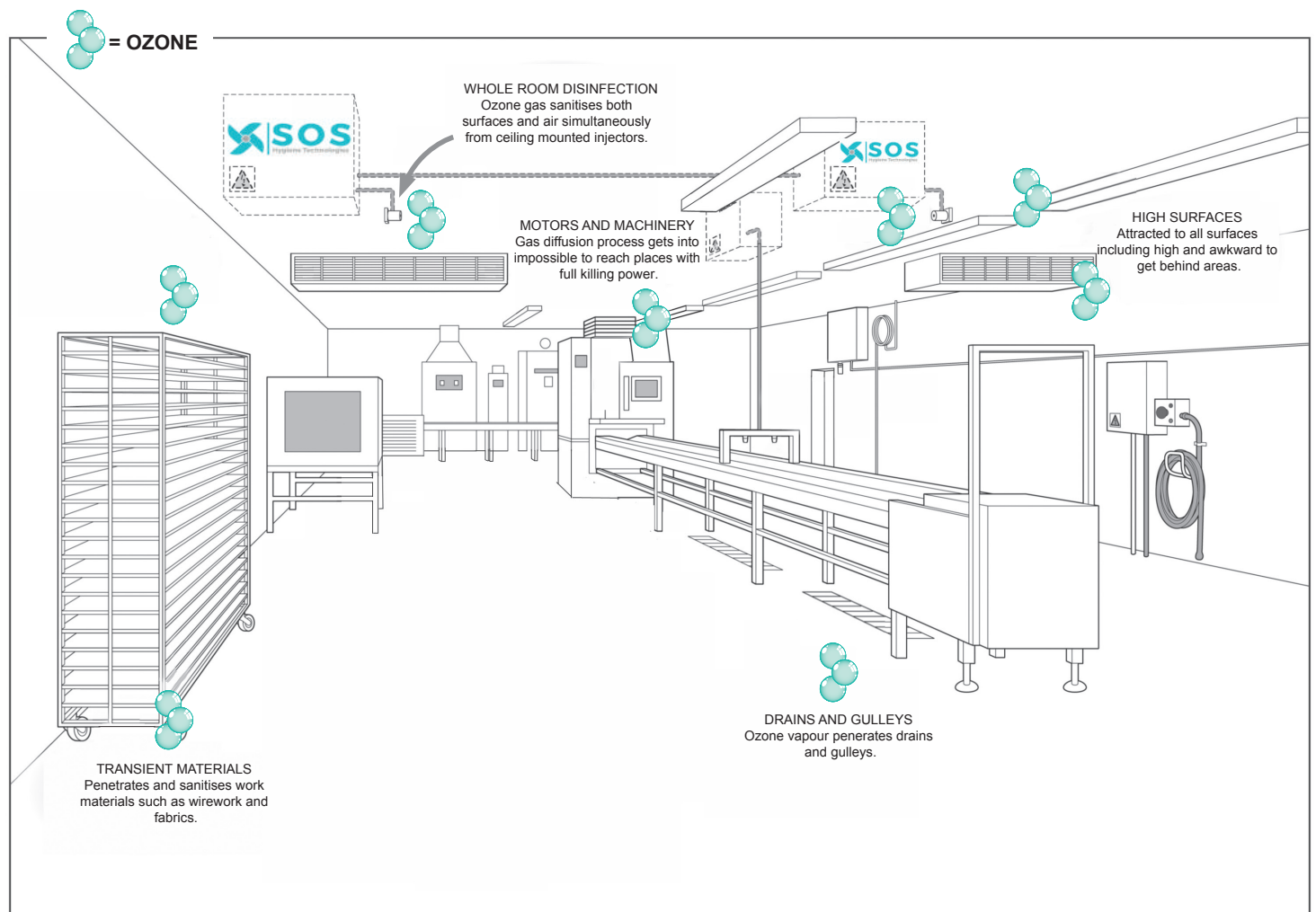
WHOLE ROOM DISINFECTION



A reliable and efficacious disinfection process to ensure the food production facility is as free from pathogens as practically possible. Mitigating the risk of foodborne disease, product recall and reduced shelf-life.

The requirement for further reduction of pathogens and identification of persistent strains has led to a significant interest in the use of whole room disinfection techniques to supplement routine cleaning and disinfection.

Whole room disinfection is a relatively new concept in biosecurity that goes further than existing hygiene regimes. The whole room disinfection application uniquely creates a biocidal vapour which penetrates all orientations in the production facility, including not only the food contact surfaces but also the hard to reach surfaces and the air itself. Effective against *Listeria*, *E.coli*, *Pseudomonas*, *Staphylococcus* and fungus.



Significant reductions in microbial activity can now be achieved daily with the background microbial load progressively reduced. Consecutive use of ozone as a supplementary disinfection shows a download trend for the number of microorganisms present on food contact and environmental surfaces, both before cleaning, after cleaning and after disinfection.

The labour free, automated system injects ozone gas into the production facility via bespoke injector nozzles, which leverages the power of ozone to rapidly kill bacteria on all surfaces and orientations and the air itself.

“Start up production with the confidence that all surfaces have been thoroughly disinfected”.



Low risk to high care transfer

The ozone transfer chamber was specifically developed in order to satisfy the need for physical segregation between low risk and high care areas in the food industry. Using ozone technology, pathogens can be quickly and effectively destroyed at this critical control point within the production process.

Ozone Transfer Chamber

Phase 1

- 1 The low risk operator loads the chamber with products to be disinfected via the low risk door.
- 2 The chamber doors are then closed and interlocked.
- 3 The low risk operator then starts the disinfection cycle using the control panel.

LOW RISK
DOOR



LOW RISK

HIGH CARE
DOOR

HIGH CARE

Phase 2

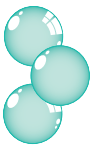
- 4 Ozone gas is injected into the chamber through bespoke injector nozzles placed in the ceiling.
- 5 Ozone gas permeates from the top of the chamber ceiling down, disinfecting all surfaces, materials and products within.
- 6 A bespoke fan is activated which mixes the ozone gas inside the chamber.
- 7 The ozone sensor inside detects when the target ppm has been reached and illuminates the control panels to inform the operators.
- 8 After the ozone cycle is complete the extraction system is activated and removes the ozone from the chamber.

Ozone Transfer Chamber

LOW RISK

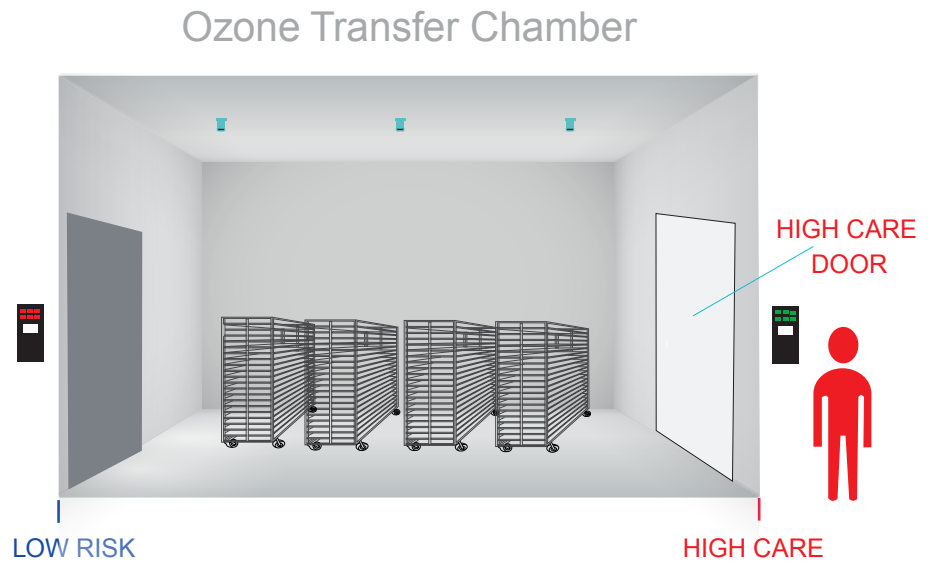
HIGH CARE
DOOR

HIGH CARE



Phase 3

- 9 The ozone sensor detects the chamber is now safe and sends a signal to illuminate the high care control panel, for the high care door to be opened. Low risk remains interlocked.
- 10 The contents can now be transferred into high care and once the chamber is empty the high care door is then closed.
- 11 The low care door is then released and can be reopened and the disinfection cycle can restart.



Benefits

- Rapid disinfection that is effective against major food pathogens including *Listeria*. Ozone kills instantly whereas chemical disinfectants require longer.
- Provides a completely dry disinfection process, with no introduction of water into high care.
- Removes the need for manual spray sanitising, mitigating the risk of operator error.
- Chemical free solution.

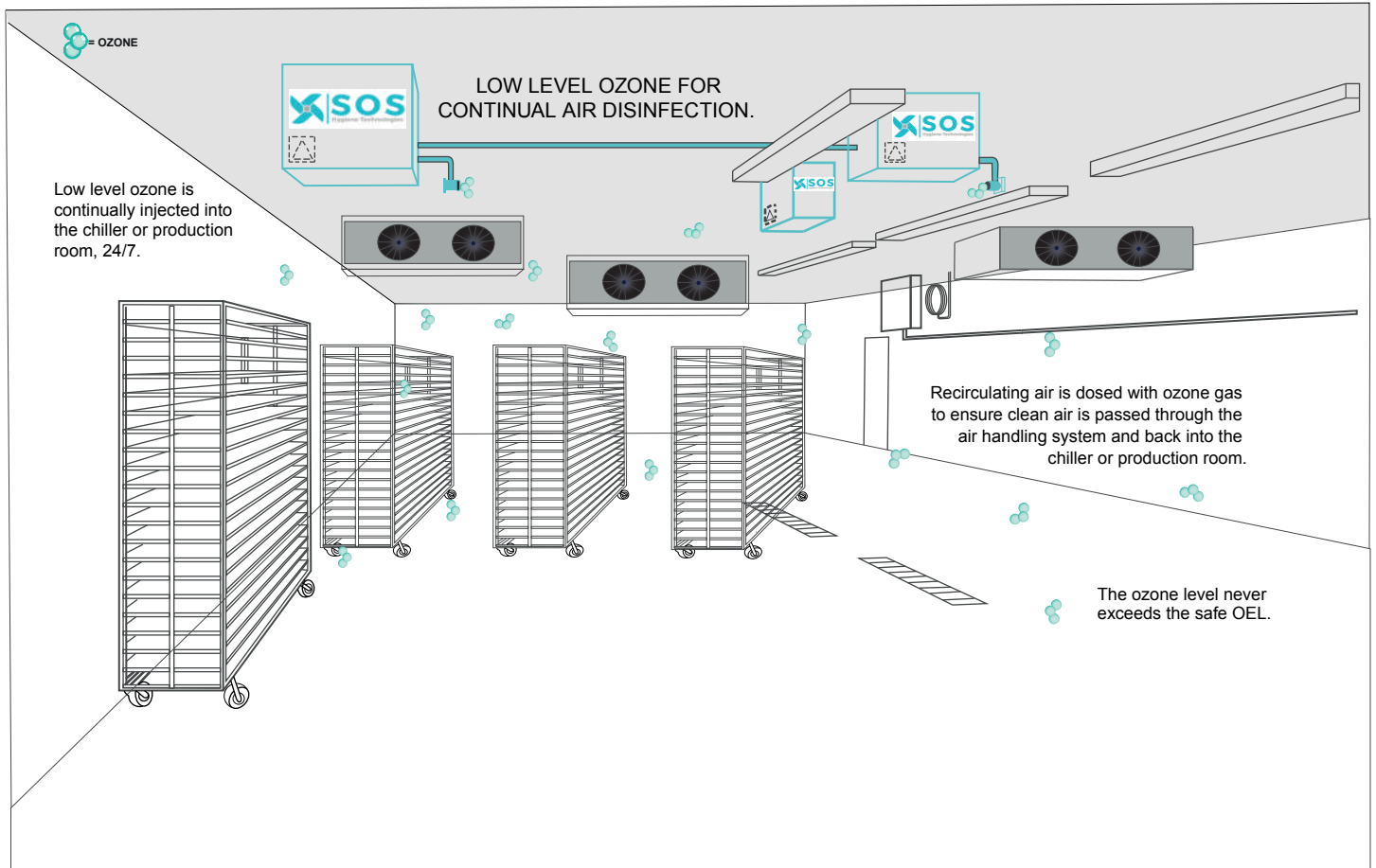


CONTINUAL AIR DISINFECTION



Low level ozone for continual disinfection of recirculating air

Continual air disinfection is achieved within the production facility and chillers via the introduction of low-level ozone through bespoke injectors mounted in the ceiling. The ozone gas is dosed 24/7 at low level concentrations and is designed never to exceed the occupational exposure limit.



Benefits

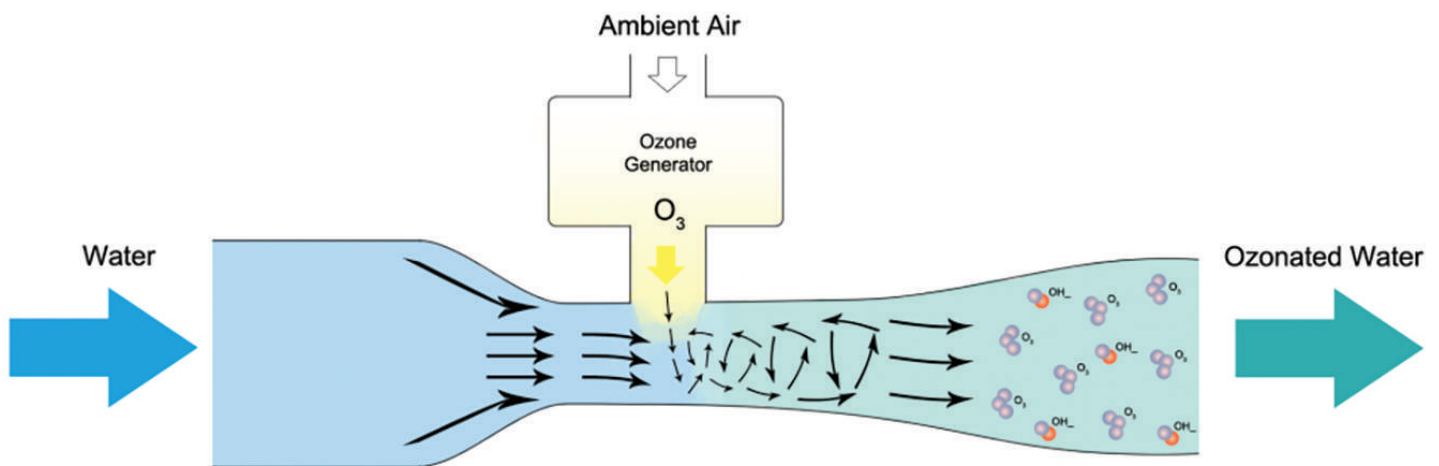
- Continual air disinfection 24 hours, 7 days a week.
- Eradicates airborne pathogens, often spread by cleaning aerosols.
- Safe to use - levels below the occupational exposure level (OEL 0.02ppm).
- Inhibits yeast and mould.
- Mitigates the risk of cross contamination.
- Reduces product spoilage and extends shelf life.
- Inhibits biofilm formation.
- Chemical free air treatment.
- Easy to install, low cost and low maintenance.
- Additional benefit of odour control.

Continual air disinfection using low level ozone is not a replacement for traditional cleaning or good hygiene practices, it is a supplementary system which aids in the reduction of pathogens in the production facility, enabling manufacturers to continue to produce safe food.



How ozonated water is formed

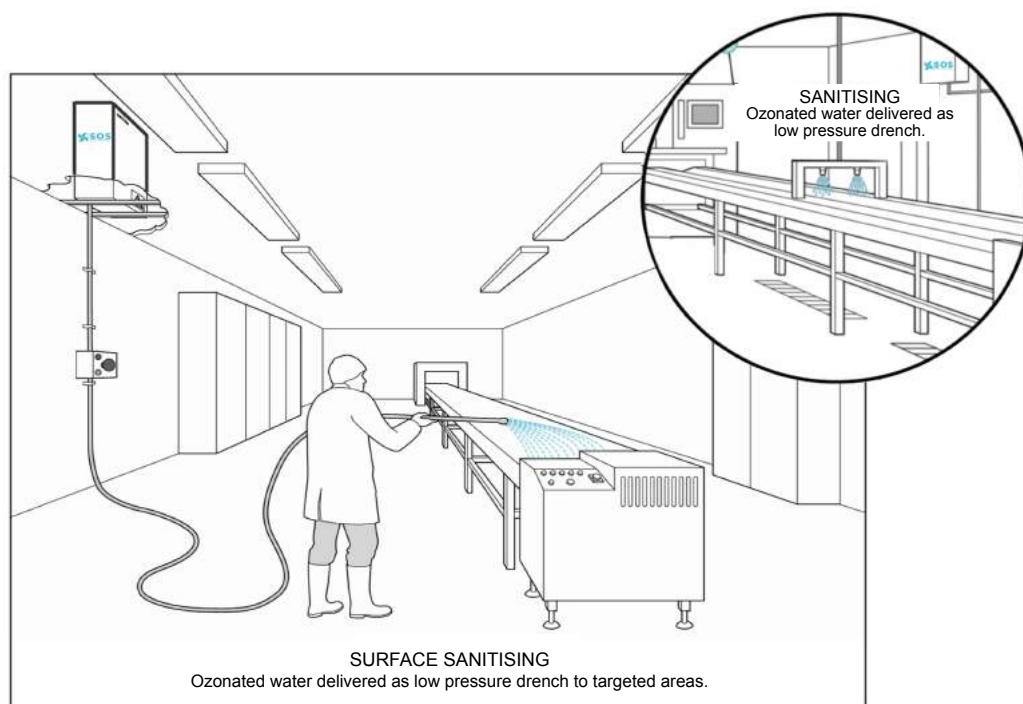
Ozonated water is created by converting ambient air into ozone gas via the ozone generator which is then absorbed into a water stream through a venturi system. The venturi system creates a vortex and forces the ozone gas into solution.



Ozonated Water in food production

Ozonated water can be used to disinfect food contact surfaces, belts and equipment in the production area, it can also be used in the final phase of CIP (Cleaning In Place) processes to disinfect pipe work, fillers and tanks. By applying the highly potent biocidal liquid to surfaces, microorganisms are instantly killed.

Ozonated water is highly effective against all common microorganisms found in the food factory environment (*Listeria*, *Pseudomonas*, *E.coli*, *Salmonella*, *Coliforms*, Yeast and Moulds). Despite its highly effective killing potential against microorganisms, ozonated water creates no risk to humans. It leaves no taint or chemical residue.





Benefits

- Superior and fast bacterial kill - no resistance.
- At a concentration of 3.7ppm dissolved ozone successfully produces a greater than 5 log reduction (99.999%) in all bacterial challenges and greater than 4 log (99.99%) reduction against yeast challenges within 5 minutes.
- Chemical free, no storage or handling.
- No taint or MRL (Maximum Residue Level).
- Cost effective and energy saving - removal of chemical cost and high temperatures used in CIP.
- Ecologically benign - no adverse impact on effluent discharge from the factory.
- Effective against biofilm formation.
- CIP - reduced operating costs and time.
- CIP - no need for a final rinse, shorter cleaning window and increased production time.
- CIP - automatic delivery with constant ozone monitoring.
- Safe and easy to use.

Ozonated water applications

- Open plant disinfection - terminal disinfectant and interim clean disinfectant.
- Belt washing - applied to production belts to provide continual disinfection throughout the day.
- Sanitising tunnel - low risk to high care disinfection, replaces traditional chemicals.
- Tray wash - final disinfection phase to provide instant microbial kill. Also reduces chemical reactions seen when mixing caustic detergents and chemical disinfectants in close proximity.
- CIP - final rinse disinfection phase, providing instant disinfection with no rinse required.
- Produce washing - replaces chlorine, no chlorate MRLs.
- Irrigation water - removes microbial loading in irrigation water before application to crops.
- Effluent treatment - reduces BOD (Biological Oxygen Demand) / COD (Chemical Oxygen Demand) in effluent treatment plants and the fines associated with exceeding set limits.

ODOUR ABATEMENT



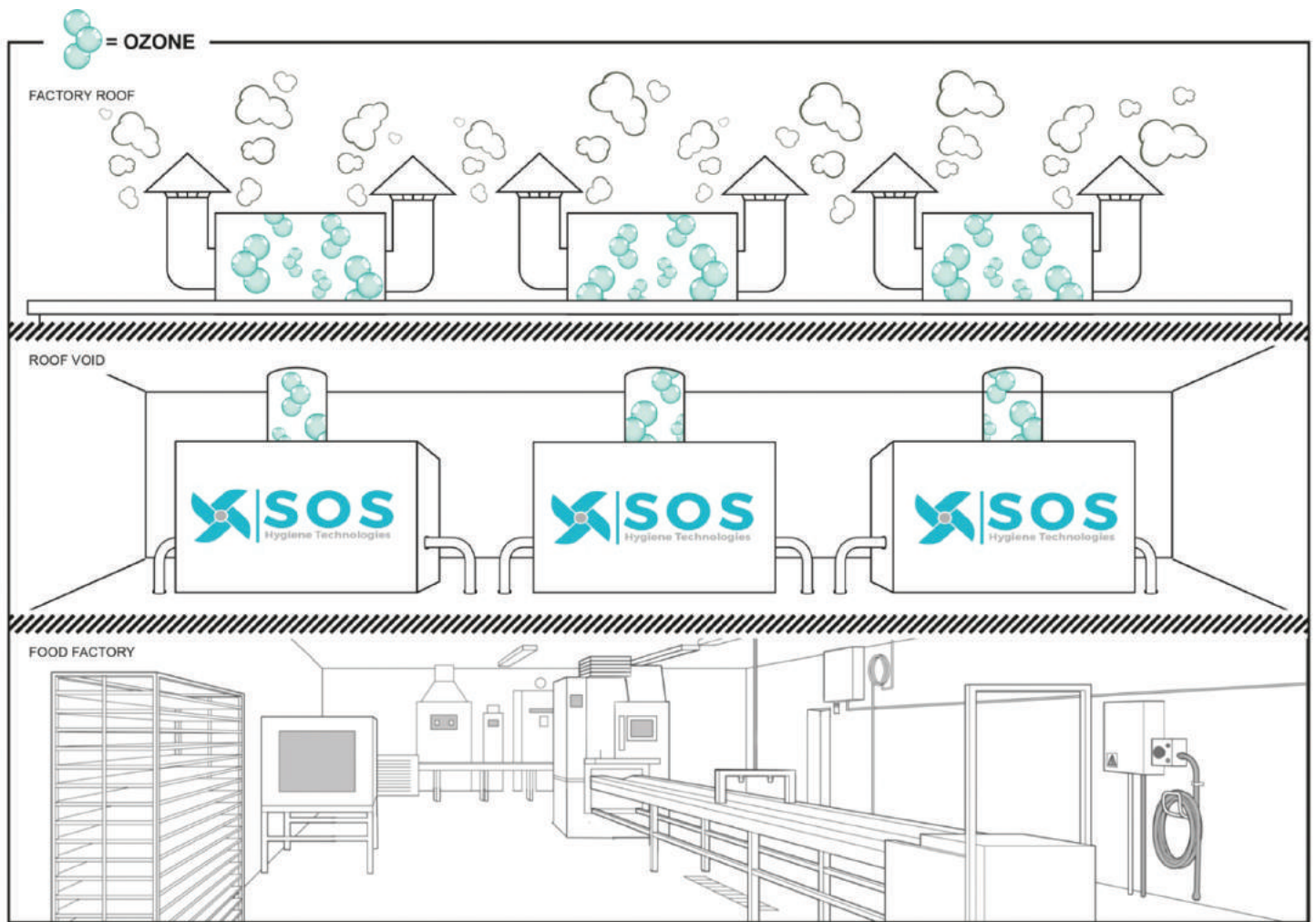
Environmental pollution and degradation take place in all sorts of ways, with industrial processes contributing a significant amount of damage.

As the regulations from Environmental Health Agencies on odour and air pollution control tightens, many food manufacturers are now seeking an effective odour abatement solution.

SOS ozone odour abatement installations utilise ozone based advanced oxidation processes (AOP) to remove industrial odours without the need for expensive carbon filters, wet scrubbers and biofilters.

How it works

Ozone odour abatement works by continually injecting ozone gas into the odourous airstream within the chimney or ducting.



Common compounds that have been identified in industrial odours (sulphides, amines and mercaptans) are effectively neutralised. Despite claims, ozone cannot oxidise ammonia, however it can eradicate all ammonia-producing microorganisms and therefore can reduce ammonia formation.

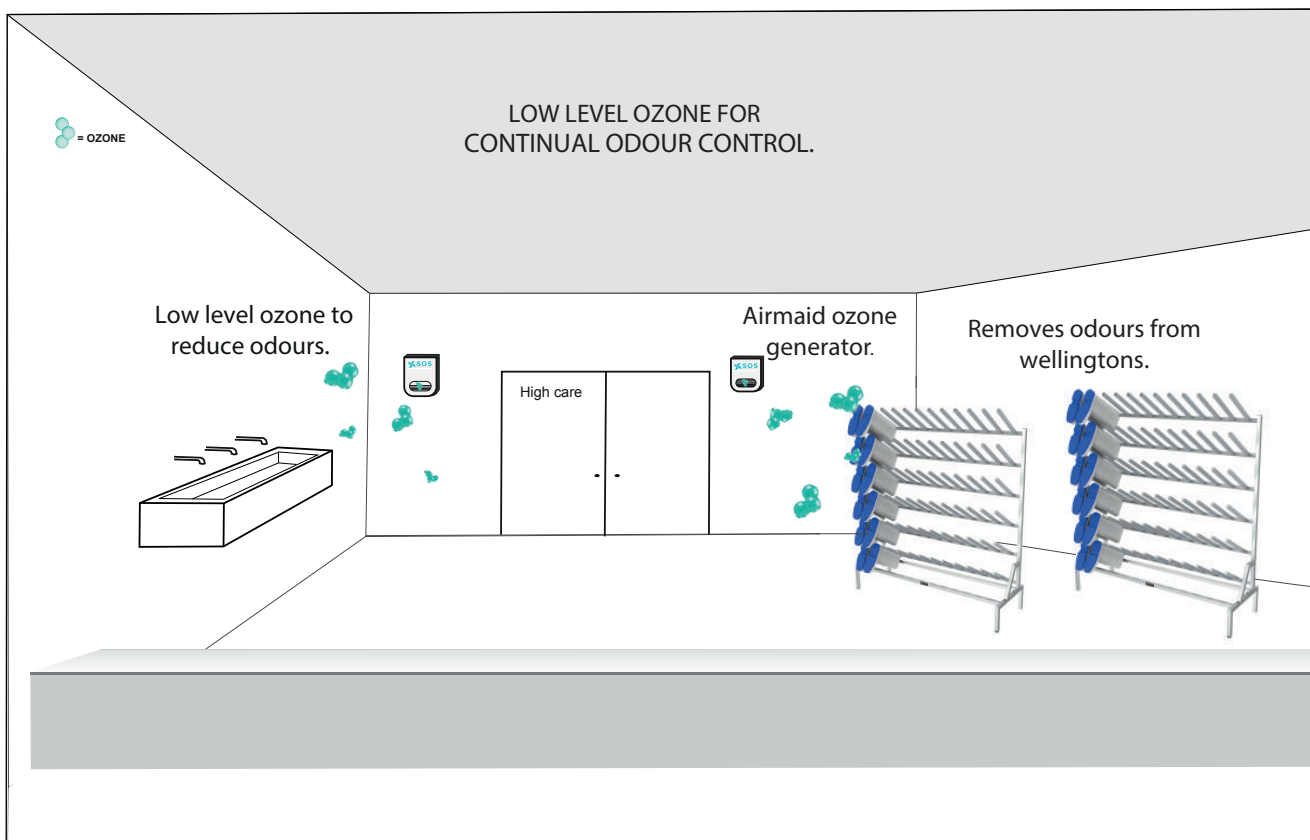


Benefits

- Fast acting removal of VOCs and odour compounds.
- Cost effective solution - no consumable chemical costs or media changes required.
- Automated system - 24/7 continual use, with built in alarms.
- Mitigates the risk of expensive fines from environmental health for exceeding odour omissions.
- Space saving odour abatement solution.
- Easy installation.

Low level ozone to continually reduce odours

Low level ozone is very effective at neutralising malodours often found in washrooms, changing rooms and around wellington racks. Adding low level ozone into your factory toilets and changing areas provides a fresh smelling environment. Odours are neutralised not masked.



Benefits

- Continual removal of odours, 24/7.
- Cost effective solution that eradicates odours, does not mask them.
- Safe to use - levels below the occupational exposure level (OEL 0.02ppm).
- Variable and timed ozone output to adjust to room size and odour strength.
- Easy installation, wall mountable.
- Low maintenance.

OZONE COMPATIBILITY CHART

Material	
Butyl	A - Excellent
Chemraz	A - Excellent
CPVC	A - Excellent
Durachlor-51	A - Excellent
Durlon 9000	A - Excellent
EPDM	A - Excellent
EPR	A - Excellent
Ethylene-Propylene	A - Excellent
Fluorosilicone	A - Excellent
Glass	A - Excellent
Hastelloy-C®	A - Excellent
Hypalon®	A - Excellent
Inconel	A - Excellent
Kalrez	A - Excellent
Kel-F® (PCTFE)	A - Excellent
PEEK	A - Excellent
Polycarbonate	A - Excellent
Polyurethane, Millable	A - Excellent
PTFE (Teflon®)	A - Excellent
PVDF (Kynar®)	A - Excellent
Santoprene	A - Excellent
Silicone	A - Excellent
Stainless steel - 316	A - Excellent
Titanium	A - Excellent
Vamac	A - Excellent
Viton®	A - Excellent
ABS plastic	B - Good
Aluminum	B - Good
Brass	B - Good
Bronze	B - Good
Copper	B - Good
LDPE	B - Good
Polyacrylate	B - Good
Polysulfide	B - Good
PVC	B - Good
Tygon®	B - Good
Stainless steel - 304	B - Good/Excellent
Acetal (Delrin®)	C - Fair
Cast iron	C - Fair
Galvanized Steel	In Water (C - Fair), In Air (A - Excellent)
Hytrel®	C - Fair
Monel	C - Fair
Magnesium	D - Poor
Steel (Mild uncoated, HSLA)	D - Poor
Zinc	D - Poor
Natural rubber	D - Severe Effect

Ozone Compatible Materials (Prolonged Exposure) Ratings - Chemical Effect

Excellent - No effect. **Good** - Minor effect, slight corrosion or discolouration. **Fair** - Moderate effect, not recommended for continuous use. **Sever effect** - Not recommended for use.



SOS HYGIENE TECHNOLOGIES LIMITED

