PATERSON

NEW ZEALAND 1955

aqualogic NT LTD

OZONE TAP

Ozone Taps:
Revolutionising the way we use water

Aqualogic NT Ozone Taps are a revolutionary new technology that essentially involves converting oxygen to ozone gas with a small generator which is then mixed with water to create ozone water straight from the tap.

ozone water can be used directly on foods, hands, surfaces and more as a safe disinfectant that naturally kills germs, bacteria and viruses. No toxic chemicals are involved. It is simply an efficient, economical, healthy, hygienic and environmentally friendly way of using water.

The Aqualogic NT Ozone Tap is currently the first and only one using the patented technology in this format.

Case Study - Ozone Taps at the Billfish Café

This is how Scott Limbrick, owner of Auckland waterfront's Billfish Café is using ozone water as part of their everyday regime:

"The tap is being used as part of our everyday cleaning, food safety and hygiene regime, and we have dramatically reduced our dependency on chemicals, without sacrificing food safety and hygiene, better for the environment, while saving us money."

- ***All staff use it to remove odours from equipment and hands.***
- ***It's particularly effective on our chopping boards that are notorious for harbouring bacteria, these come up looking like new after being washed in ozone water.***
- ***All ground grown vegetables are being washed in ozone water before use.***
- ***All citrus is being washed in ozone water before use.***
- ***We use it as our drinking water for customers, which also has ice in it made from ozone water.***
- ***We wash our cleaning equipment and cloths in it constantly throughout the day.***
- ***We wash our hands in it regularly.***
- ***As a final end of shift clean we put ozone water in a spray bottle and mist all areas, which sanitises all work surfaces.***

"Now we've got an ozone tap, I couldn't see us not having one."

Ground breaking in bacteria control.

- Kills bacteria 3100 times faster than chlorine, and is safe to drink.
- Kills all common food pathogens, E-coli, Listeria, Shigella, Salmonella, Hepatitis A and Legionella.
- Stays active in open stored water for 20 minutes and kills bacteria and viruses on contact.
- Eliminates the use of hot water and conventional sanitisers.

What are the benefits of installing an Ozone Tap?

Aqualogic NT Ozone Taps can be used to enhance pratical applications as well as address hygiene and health issues across a broad spectrum of businesses that include hotels, hospitals, medical clinics and restaurants. For personal health, ozone water is beneficial for the skin by keeping it free from germs and reducing the incidence of acne, eczema and psoriasis. It is also excellent for washing sores and cuts to prevent infection and for tooth cleaning to prevent decay and halitosis.

What is ozone?

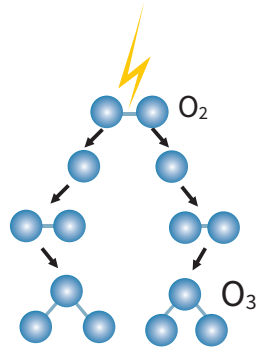
The chemical formula of ozone gas is O_3
It is another form of oxygen (O_2)

Ozone is basically active oxygen. It occurs naturally high in the earth's atmosphere and protects us from the sun's cancer-causing UV rays. This is the ozone layer that nature provides us for protection as many of us have come to know.

When lightning strikes, oxygen in the atmosphere is supercharged by the high voltage generated and ozone is produced. The "fresh scent" we often experience after a thunder and lightning storm is actually the natural smell of ozone.

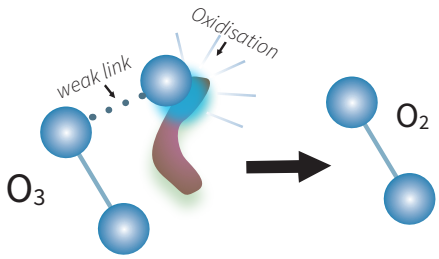
How do Ozone Taps work?

Ozone creation:



Ozone is created when electrical energy splits an ordinary oxygen molecule (O_2), starting a chemical reaction that results in ozone (O_3).

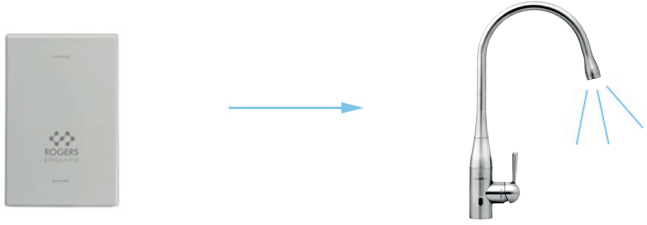
Electrical energy splits O_2 molecule into two O_1 atoms. When the free O_1 atoms unite with other O_2 molecules, ozone is created $(O_1) + (O_2) = (O_3)$



The third oxygen atom is connected to the other two atoms by a weak link (see the dotted line in the diagram). This weak link makes the ozone molecule highly unstable, which is the key to its outstanding oxidising and sanitising prowess. Because of its instability, the third oxygen atom can combine with organic and inorganic matter to destroy them through oxidisation. Only O_2 molecule (the oxygen we breathe) is left in the air after the oxidisation process is over.

Generator and Mixer:

Ozone gas is generated by electric charge in the generator which is installed under the sink. The gas is then carried by a tube to the tap where it is mixed with water.



Why is ozone much better than chlorine?

Ozone is known to be the most effective anti-microbial disinfectant on earth. It disinfects and sterilises by killing all the germs, bacteria and viruses it comes in contact with. Ozone reacts 3,000 times faster and is more than 100 times stronger* than chlorine, hence it is much more effective in killing germs, bacteria and viruses. Although chlorine is widely used today for water treatment in most countries, it is also highly toxic and detrimental to the environment. Unlike chlorine, ozone does not leave unwanted chemical residues in the water. Chlorine water treatment involves adding toxic chemicals into the water whereas Rogers England Ozone Water System merely adds ozone (a totally natural element) into the water. Ozone eventually reverts back into oxygen and then dissipates into the air without any chemical residues whatsoever.

* Based on scientific comparative tests on the effect of chlorine and ozone on E. coli, the most common faecal pathogen that may be found in uncooked food and untreated water.

Is ozone fully proven, tested and recognised?

Yes. It is now being used to treat drinking water in hundreds of facilities in countries across the world such as France, Germany, the UK, the US and Australia. International bottled drinks companies have been using ozone for many years to disinfect water. Having previously used chlorine for the bottling process, they have found that ozone is by far the superior solution in providing consumers with safe, fresh-tasting drinks. Due to its potent property as an anti-microbial disinfectant, ozone is also being used to sterilise operating theatres and medical wards in hospitals that are exposed to highly infectious diseases.

Approvals and Certifications

Aqualogic NT Ozone Taps have been fully tested and approved by independent, accredited organisations and international certification bodies for having successfully met the requirements of various safety, integrity and quality standards.

Aqualogic NT Ozone Taps are certified by the Water Regulations Advisory Scheme (WRAS), UK. In general, certification under this UK certification scheme is recognised and accepted under the Water Supplies Department of Hong Kong as having fully conformed to their requirements.

The National Sanitation Foundation (NSF) of the USA is one of the most highly regarded authorities on sanitary plumbing products. Aqualogic NT Ozone Taps are approved and certified in compliance with NSF/ANSI61 (an NSF certification scheme) which ensures that our entire system including all its components will not pose any adverse health effects. Aqualogic NT Ozone Taps are also certified under AB1953 (California Assembly Bill 1953), specifying its lead content level is below 0.25%, hence it is able to deliver water that is safe for human consumption.

The CUPC Mark was developed in response to an industry request for a uniform code for testing plumbing supply fittings that would be acceptable in both Canada and the USA. Aqualogic NT Ozone Taps are CUPC certified, hence it is allowed for sale in both Canada and the USA.

WaterMark - WaterMark is an Australian certification scheme for plumbing and drainage products. All plumbing products must first secure WaterMark certifications before being allowed for sale in Australia and New Zealand. Aqualogic NT Ozone Taps have acquired this certification.

CE - The Aqualogic NT Ozone Tap's ozone generator is fully compliant with the CE marking for Low Voltage Directive (LVD) and Electromagnetic Compatibility Directive (EMC) in the European Economic Area (EEA). The LVD ensures that the electrical component will be used safely for its intended applications. The EMC requires that products must not emit unwanted electromagnetic pollution (interference) that might disturb radio and telecommunication as well as other equipment.

Laboratory Testing: Kill rate for key pathogens

Bodycote

Bodycote Testing Group's (now known as Exova) laboratories comply with ISO/IEC 17025, the international standard against which the competence of testing and calibration laboratories is assessed. Their services are accredited through the National Accreditation Bodies of the various countries in which they operate.

Test results conducted in Quebec, Canada on kill rate for key pathogens (see below) show that under running water from an Aqualogic NT Ozone Tap, 99.9% of the four key pathogens are eliminated in less than 10 seconds of washing.

RESULTS

Table: Reduction percentage and logarithms for strains in contact with ozone water

	Reduction Percentage (ozone water)	Reduction Logarithms (ozone water)
Clostridium difficile		
10 seconds	99.9040%	3.0177
20 seconds	99.9414%	3.2323
30 seconds	99.9854%	3.8365
Escherichia Coli		
10 seconds	99.9995%	5.3274
20 seconds	99.9995%	5.3274
30 seconds	99.9995%	5.3274
Salmonella Typhimurium		
10 seconds	99.9982%	4.7403
20 seconds	99.9991%	5.0414
30 seconds	99.9991%	5.0414
Staphylococcus Aureus		
10 seconds	99.9985%	4.8129
20 seconds	99.9997%	5.5188
30 seconds	99.9997%	5.5188

About the four key pathogens

Clostridium difficile, Escheria coli (E.coli), Salmonella Typhimurium and Staphylococcus Aureus are four key pathogens that produce toxins which cause illness in mankind. These bacteria are commonly known to cause diarrhoea and food poisoning symptoms among other afflictions.

These pathogens can be spread from person to person due to poor hygiene, improper washing of hands after visiting the toilet, or the consumption of contaminated food and water. Coming in contact with infected animals is also another cause. Some bacteria can also contaminate their surroundings, such as toilets, bedclothes, skin and clothing.

For commercial premises that deal with food preparation, healthcare, children and even pets it is imperative that the threats posed by pathogens such as these are neutralised and eliminated.

Legionnaires' Disease

Legionnaires' Disease is caused by Legionella bacteria. It is a form of pneumonia which kills between 5 to 15% of those infected. Legionella can also cause less serious illness such as Pontiac or Lochgoilhead fever.

The disease is acquired through breathing in air containing the Legionella bacteria. They may spread from fine droplets generated from water containing the bacteria such as showers and taps, cooling towers and evaporative condensers, spa baths and saunas, ornamental fountains and even humidified food displays.

Laboratory Testing: Kill rate for Legionella pneumophila bacteria

SGS

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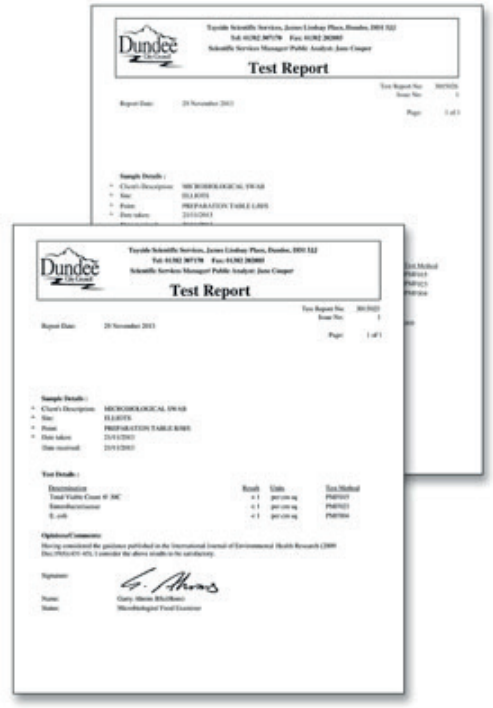
Independent surface testing for food safety



Surface testing by Tayside Scientific Services using a microbiological swab confirmed that our ozone water is as effective as an approved chemical disinfectant in the UK.

Tayside Scientific Services, based in the UK, provides chemical and microbiological analytical testing service mainly to local authorities and public bodies as well as the private sector. They also support Local Authority Environmental Health and Trading Standards Departments to enforce the provisions of the Food Safety Act and Agriculture Act in the UK. Tayside Scientific Services has conducted surface testing using a microbiological swab to conform the effectiveness of our ozone water, comparing against that of an approved chemical disinfectant in the UK.

For the test, some raw meat, seafood and vegetables were rubbed onto a chopping board and then left for bacteria to form. A first swab was then taken from the chopping board surface filled with bacteria. The chopping board was then cleaned with an approved chemical disinfectant before taking a second swab.

The same test was repeated, this time using the ozone water from an Aqualogic NT Ozone Tap as the cleaning agent instead of a chemical disinfectant.

In both tests, the results were satisfactory.

The implication here is that restaurants and eateries can safely use our ozone water to perform the same function as chemical disinfectants. Not only would these establishments save money, but they would also use less chemicals, contributing to a friendlier environment.

Pesticides testing on cabbage

SGS

A spoon cabbage specimen was tested for trace amounts of pesticides that are commonly used in conventional vegetable farming.

The same test was carried out again - this time, after the same spoon cabbage has been washed under our ozone water for 30 seconds.

Test results conducted by SGS show that 99.9% of the four pesticides detected earlier - Chlorpyrifos, Dimethomorph, Pencycuron and Quinoxyfen were removed after washing under our ozone water for 30 seconds.

BEFORE

Washing with Ozone Water	Test Results ppm (mg/kg)	Detection Limit ppm (mg/kg)
Chlorpyrifos	12.12	0.01
Dimethomorph	6.66	0.01
Pencycuron	2.38	0.01
Quinoxyfen	0.03	0.01

AFTER

Washing with Ozone Water	Test Results ppm (mg/kg)	Detection Limit ppm (mg/kg)	Removal Rate (%)
Chlorpyrifos	0.01	0.01	99.9%
Dimethomorph	Not Detected	0.01	Almost 100%
Pencycuron	Not Detected	0.01	Almost 100%
Quinoxyfen	Not Detected	0.01	Almost 100%

Testing for ozone overspill

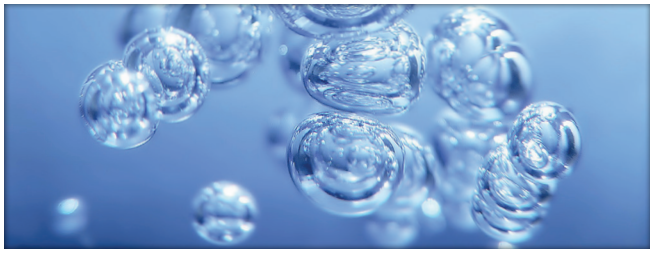
The Food and Drug Administration (FDA) in the USA and the Health and Safety Committee in the UK have published both legal and guideline practices on the overspill or amount of ozone gas that is allowed to spill into the air from any type of device, machine or process, and the amount of time that any working employee can be exposed to the ozone gas.

The FDA rule basically states that the maximum acceptable level of ozone gas spillage from any ozone generating device should not exceed 0.05 part per million (ppm) by volume of air in the atmosphere of enclosed space intended to be occupied by people for extended periods of time, e.g., houses, apartments, commercial kitchens, medical clinics, hospitals, kindergartens and offices.

The test is conducted in a "standard room" measuring 1.80m x 3.30m x 2.50m. The ozone device is then set up and left running in the middle of the room. An ozone probe is set up exactly 90cm away from the ozone device to measure the ozone concentration spillage from the ozone device, at intervals of one minute per reading, continuously for 30 minutes. The average of 30 readings is aggregated and adopted as the final test result.

The Aqualogic NT Ozone Tap has been independently tested as such by SGS International Testing Laboratories and the testing results show an average spillage of 0.003ppm - well below the safety guidelines set by the FDA. To put this in perspective, the overspill of 0.003ppm from our ozone system amounts to only 6% of the maximum allowable limit.

In the process of generating ozone water, the amount of ozone gas that is mixed into the water denotes the effectiveness of the system. This test result is also an unequivocal proof that ozone tap mixing system creates the maximum concentration of ozone water with the least overspill of ozone gas into the atmosphere. This level of efficiency is of the highest level possible and is unmatched by any other competing products in the market today.



RESULTS					
Time (Min)	Concentration (Min)	Time (Min)	Concentration (Min)	Time (Min)	Concentration (Min)
1	0.002	11	0.003	21	0.003
2	0.002	12	0.002	22	0.003
3	0.003	13	0.002	23	0.003
4	0.003	14	0.003	24	0.003
5	0.003	15	0.003	25	0.003
6	0.003	16	0.003	26	0.003
7	0.003	17	0.003	27	0.002
8	0.003	18	0.003	28	0.003
9	0.002	19	0.003	29	0.003
10	0.003	20	0.002	30	0.002
Average = 0.003ppm					

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