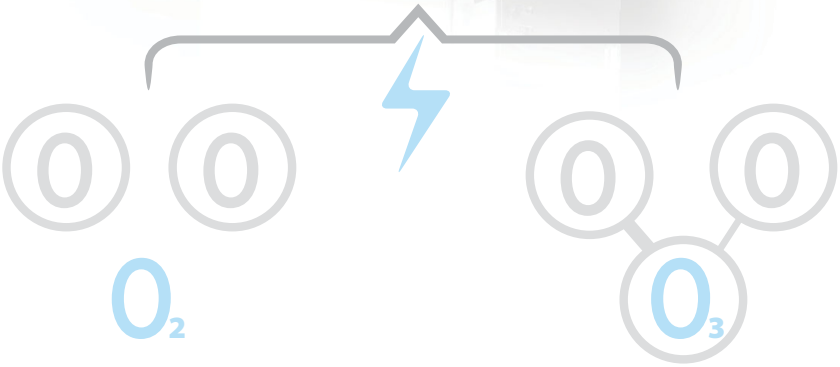
BE®
Machinery



Ozone Sterilization Unit

AOM Series

Ozone Package Sterilization Unit – The Principle Function:

Overview

The markets has an increasing demand to fruits, vegetables and salads clean of any contamination from pathogens and chemical contaminants or detergents.

Ozonized water is used in a variety of operations to wash fruits and vegetables including ready to eat salad products.

As mentioned, Ozone is a more powerful disinfectant than Hydrogen Peroxide, chlorine, chlorine dioxide and many of the industry disinfectant agents. As said Ozone effective against an Extremely wide range of pathogens .

Ozone is said to be about 50% more powerful and to act 3,000 times faster than chlorine at 100 times the strength.

What is Ozone and how it's produced?

Ozone, or trioxygen, is a fast-acting oxidizing disinfectant made up of three oxygen atoms (O_3). Ozone occurs naturally in the upper atmosphere, or stratosphere, when the sun's light splits oxygen molecules (O_2) into separate atoms. When these single atoms bond with other oxygen molecules, they form ozone, protecting us from the sun's harmful ultraviolet rays.

The word "ozone" comes from the Greek "ozein" meaning "to smell", and was discovered by a Swiss-German chemist and professor at the University of Basel (Switzerland) Christian Shönbein. Shönbein identified it as a different form of oxygen and gave it the name Ozone in 1840, because of the peculiar smell that it produces, such as what occurs during storms.

Advantages of Ozone

- Ozone is the most powerful oxidant for disinfecting water or sanitizing surfaces
- Ozone can kill pathogens in seconds vs. several minutes for other oxidants
- Ozone is one of the strongest oxidant available for oxidizing organics
- Ozone decomposes into oxygen
- Ozone, by itself, does not affect pH
- Ozone cannot be stored; therefore, having a large volume of a dangerous oxidizer is not possible
- Ozone is excellent at oxidizing metals such as iron, manganese, and more
- Ozone enhances the flocculation and coagulation of organic material thereby improving filtration
- Ozone can be effective in partially oxidizing organics in the water to biodegradable compounds that can be removed by biological filtration
- Up to this date, there has not been a single bacteria, virus or cyst discovered that can withstand Ozone!

History of the use of Ozone In the Food Industry And its regulation

1910 First use of ozone for the preservation of frozen meat in Germany.

1936 Ozone began being used to wash and protect fish in the commercial seafood industry in France.

1942 Ozone used to protect dairy products while in storage, such as eggs and cheese in the United States.

1977 Ozone treatment used to fight Salmonella bacteria, a major cause of food poisoning, from contaminating eggs in Russia.

1982 Ozone approved by the FDA (Food and Drug Administration) as GRAS (Generally Recognized as Safe) for bottled water in the United States.

1995 FDA reaffirms GRAS declaration for bottled water.

1997 A panel of experts determined, thanks to the efforts of the Research Institute of Electric Power Industry and Food, that ozone could be declared GRAS for food processing in the United States.

2001 Ozone receives FDA recognition as a direct food additive second class. FSIS (Food Safety and Inspection Services) determines that ozone is safe for use in meat and poultry.

Proven Technology – Ozone Efficiency Tests:

Ozone in comparison to main disinfection compounds

Oxidizing Reagent	Oxidizing Potential
Ozone	2.07
Hydrogen Peroxide	1.77
Permanganate	1.67
Hypochlorous Acid	1.49
Chlorine Gas	1.36
Hypobromous Acid	1.33

Oxidizing Reagent	Oxidizing Potential
Oxigen	1.23
Bromine	1.09
Hypoiodous Acid	0.99
Chlorine Dioxide	0.95
Iodine	0.54

(Source: Ullmanns, 1991)

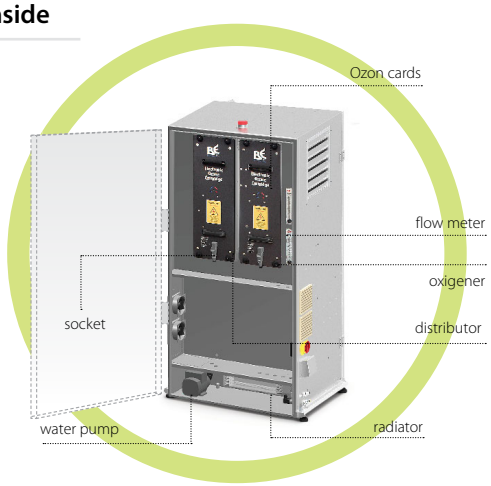
Ozone Efficiency Tests:

Harmful substance	Removal rate
Aspergillus Niger (Black Mount)	Destroyed by 1.5 to 2 mg/l
Bacillus Bacteria	Destroyed by 0.2 m/l within 30 seconds
Bacillus Cereus	99% destruction after 5-min at 0.12 mg/l in water
B. Cereus (Spores)	99% destruction after 5-min at 2.3 mg/l in water
Bacteriophage F2	99.99% destruction at 0.41 mg/l for 10-seconds in water
Botrytis Cinerea	3.8 mg/l for 2 minutes
Clavibacter Michiganense	99.99% destruction at 1.1 mg/l for 5 minutes
Cladosporium	90% reduciton at 0.10-PPM for 12.1 minutes
Coxsackie Virus A9	95% destruciton at 0.035 mg/l for 10-seconds in water
Diphtheria Pathogen	Destroyed by 1.5 to 2 mg/l
Eberth Bacillus (Typhus Abdomanalis)	Destroyed by 1.5 to 2 mg/l
Echo Virus 29	The virus most sensitive to ozone. After a contact time of 1 minute at 1 mg/l of ozone, 99.999% killed
Enteric Virus	95% destruction at 4.1 mg/l for 29 minutes in raw wastewater
Escherichia Coli Bacteria (from feces)	Destroyed by 0.2 mg/l within 30 seconds in air
E-coli (in clean water)	99.99% destruction at 0.25 mg/l for 1.6 minutes
Encephalomyocarditis Virus	Destroyed to zero level in less than 30 seconds with 0.1 to 0.8 mg/l
Enterovirus Virus	Destoryed to zero level in less than 30 seconds with 0.1 to 0.8 mg/l
Fusarium Oxysporium F Sp. Melonogea	99.99% destruction at 1.1 mg/l for 20 minutes
GDVII Virus	Destroyed to zero level in less than 30 seconds with 0.1 to 0.8 mg/l
Hepatitus A Virus	99.5% reduction at 0.25 mg/l for 2-seconds in a phosphate buffer
Herpes Virus	Destroyed to zero level in less than 30 seconds with 0.1 to 0.8 mg/l
Influenza Virus	0.4 to 0.5 mg/l threshold value
Klebs-Loffler Bacillus	Destroyed by 1.5 to 2 mg/l
Legionella Pneumophila	99.99% destruciton at 0.32 mg/l for 20 minutes in distilled water
Luminescent Basidiomycetes	Destroyed in 10 minutes at 100-PPM
Mucor Piriformis	3.8 mg/l for 2 minutes
Mycobacterium Avium	99.9% with a CT value of 0.17 in water
Phytophthora Parasitica	3.8 mg/l for 2 minutes
Poliomyelitis Virus	99.99% kill with 0.3 to 0.4 mg/l in 3-4 minutes
Poli ovirus Type 199.	5% destruction at 0.25 mg/l for 1.6 minutes in water

(Source: Ozone cip project – Study of ozone technology, public report) • **http://www.ozonecip.net/pdf/Ozonetechnology.pdf**

Front view

Front view inside



Sterilization unit specifications

Working Air Pressure	Min. 6 bar Max. 8 bar
Voltage	400 V
Current	16 A
Total weight	Approx. 500 kg
Ozone output	Up to 120 gr/h (it is possible to connect to a single unit external ozone cards up to 600 gr/h)

Beth-El Machinery Product Lines Include

The AFR and ACR series
High Clean Rotary Filler and Capper

With extremely high hygienic standards, our machines provide filling and capping for products with a long shelf-life. Available with an output speed of between 1000 and 6000 containers per hour, depending upon the product.

A servo driven CNC filling machine's functions are fully servo or, pneumatic driven, and controlled from the control panel.

The High Clean Continuous Bottle Cleaner

From the AWC series, these machines have a highly flexible set-up which can accommodate containers with a variety of sizes and shapes.

Incorporating a range of capabilities, the High Clean Continuous Bottle Cleaner has an output speed of up to 15,000 containers per hour.

The AFR series High Clean Filling

These machines are designed for an extremely high hygienic standard, and enable products to maintain a long shelf-life.

The Inline Filling Lines are capable of output speeds up to 3600 containers per hour.

Custom Processing Line Engineering and Manufacturing

Beth-El Machinery produces turnkey projects in the engineering and manufacturing of custom processing lines, pasteurization, deaeration, product recovery systems, and homogenizer systems.

Applications include fermentation, carbonation, control systems, and batch and continuous mixing and blending systems for various fields in the food, chemical, and pharmaceutical industries.

Beth-El Machinery's process units, systems, solutions, and complete processing plants are a direct result of engineering expertise within core disciplines, the goal being to apply these varied technologies in the most efficient and reliable ways to produce the highest quality process systems and plants available. Beth-El Machinery designs and manufactures the systems that, in turn, do the work for you.

Core Expertise:

- Liquid processing
- Mass & heat transfer
- Controls & automation
- Packaging Machines
- Sterilization Units
- Ozone Water Units

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