

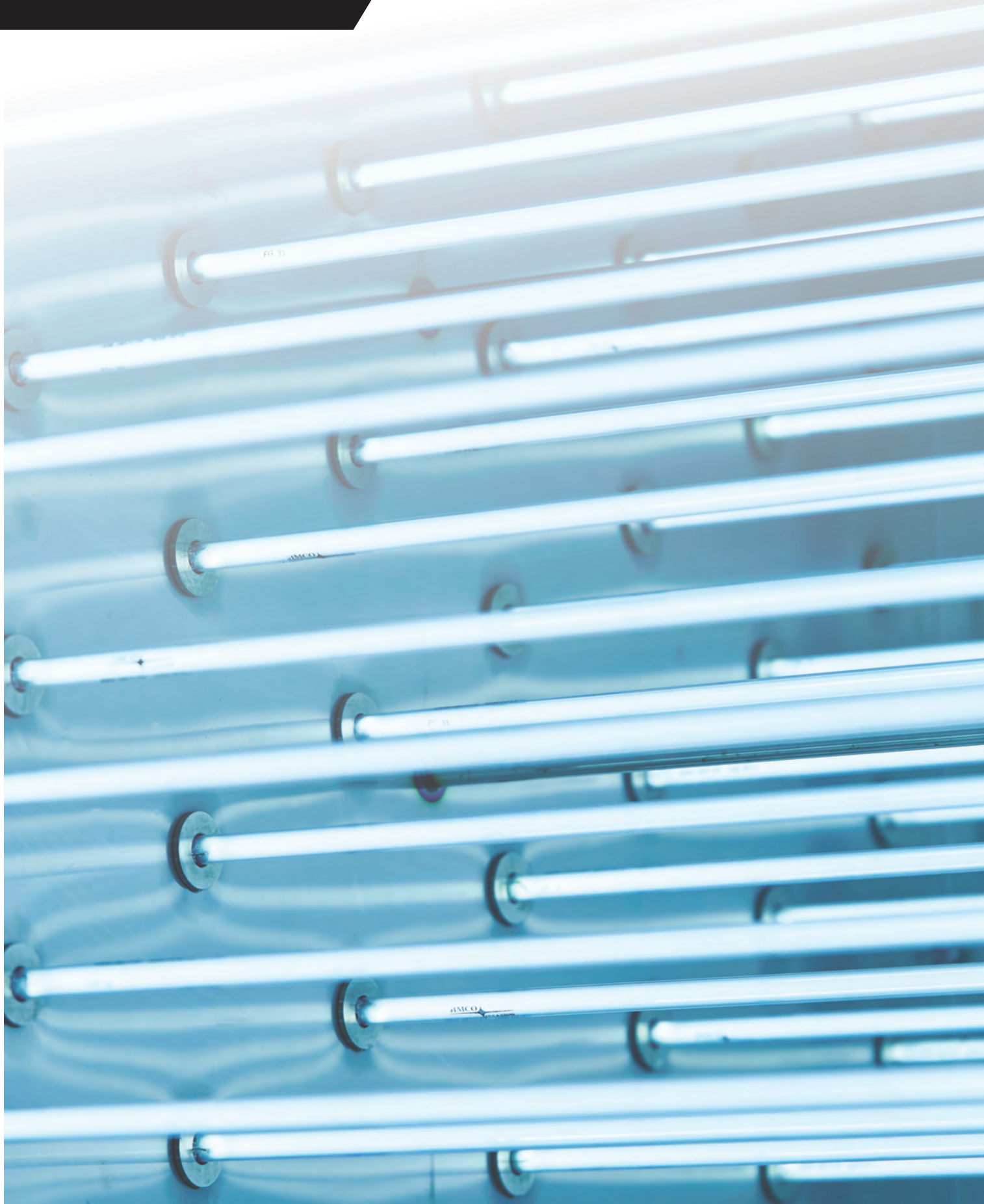
**JIMCO**<sup>®</sup>

UV-C & OZONE  
Technology

DISINFECTION  
FLO-D<sup>®</sup> TECHNOLOGY

DANISH DESIGN & TECHNOLOGY - FOR THE FUTURE

# DISINFECTION



# INNOVATION AND DRIVE

Technology for the future - designed and developed in Denmark

Jimco A/S is the company behind some of the world's most unique air and waste-water purification and sterilisation solutions.

Since designing its very first air-cleaning unit in 1993, Jimco A/S has not looked back. Today, the company supplies its products to a large number of industries and institutions worldwide. Its customer base comprising factories within the food industry, commercial kitchens, waste-water treatment plants, schools and nursing homes. In brief, Jimco A/S undertakes all types of projects – large and small.

Jimco A/S combines common sense with innovative thinking as the basis of the company's unique products. It is no coincidence that Jimco A/S supplies air-treatment units to some of the biggest chains in the world – including McDonald's, Scandic Hotels, McCain, Danish Crown etc.

## COMPLETE DISINFECTION OF SURFACES IN PRODUCTION FACILITIES

**Efficient disinfection – without manual procedures, chemicals or water.**

With the introduction of the UV-C-based disinfection of surfaces, we now add yet another field of application to our patented UV-C technology, which has been awarded the EU Environmental award and which since 1993 has been used in air cleaning – systems which i.a. are used for removing obnoxious smells, improving the indoor climate as well as reducing the danger of fire and infection.

The fact that it is now possible to disinfect surfaces, which would normally require a manual treatment, involves a large number of advantages for the operating economy, the environment as well as the work environment.



### WHY CHOOSE JIMCO DISINFECTION TECHNOLOGY?

- ✓ Avoid time-consuming manual disinfection with water and chemicals.
- ✓ Save litres of water by the tons as well as energy for heating and drying.
- ✓ Disinfect more efficiently in corners, chinks and ventilation ducts, cooling coils and surfaces.
- ✓ Avoid strong chemicals, which have an impact on the environment and work environment.
- ✓ Avoid an environmentally harmful release of chlorinated waste-water.

# PRACTICAL USE



# SURFACE DISINFECTION AND ODOUR REMOVAL

Food Industry – Refrigerated Containers – Limited Areas – Health Sector

## It can be expensive.

A food production factory can be exposed to bacteria and mould even if a high standard of hygiene is in place. Manual surface disinfection of work surfaces, machinery and freezers etc. can often allow an unusually high number of bacteria to remain.

Unpleasant odours can also cause inconvenience. In these cases, money may be lost through complaints, resulting in bad publicity, and spoilt products.

## It is easy to be at the front edge.

By simple use of the mobile FLO-D® air cleaners, you will quickly and effectively disinfect and remove unpleasant odours from the air in a confined production space.

The daily cleaning of production areas is the most important function, in order to maintain a high standard of hygiene and by using the FLO-D® you will also prevent mould, fungus or any other type of micro-organisms from forming on equipment, walls or ceilings.



## VERY POSITIVE RESULTS – OF TESTS AS WELL AS PRACTICAL USE

Prior to the introduction of our solutions for UV-C & Ozone-based disinfection, we have for some time conducted full-scale tests in various companies in cooperation with DTU (Technical University of Denmark) and The National Institute for Aquatic Resources. The results were impressive.

Furthermore, various tests carried out in cooperation with The South Danish University have shown that concentrations of for instance listeria and salmonella bacteria can be almost completely destroyed by means of our technology and within only two hours.

## SOME FACTS ON OZONE AND IT'S USE

1.

Ozone is a potent antimicrobial agent, which can effectively kill viruses, bacteria, fungi and parasites, including those causing food spoilage or human diseases.

2.

The efficiency of ozone depends on the target microorganism and the treatment condition.

3.

Ozone destroys microorganisms by reacting with particular oxidizable cellular components, the end reactions of which result in cell damage and death of microorganisms.

4.

Ozone as opposed to other chemical treatments destroys microorganisms instantly and effectively, without leaving harmful residues in treated food or surfaces, hence is safer and environmentally friendlier than most other antimicrobials.

5.

The production and use of ozone in food processing is safe, provided that its concentration is controlled and monitored. The permissible level of exposure to ozone is 0.1 ppm in workplace and food processing environments for 8 hours.

## FIND OUT HOW MUCH YOU CAN SAVE

It is easy to calculate the amount of savings that your company will be able to gain in terms of manpower, water, heat, electricity and chemicals, simply by shifting to an automatic, environmentally friendly disinfection.

Solutions for UV-C & Ozone-based disinfection can be rented at Jimco A/S.

# AUTOMATIC DISINFECTION OF COLD STORAGE

Disinfect effectively - without manual processes, chemicals or water

Production manager Morten Tønder from Danfrugt A/S. says: -The results demonstrate that UV-C produced ozone is beneficial to the production environment. In practice, this means that we can keep our exotic fruits fresh for two weeks longer. Danfrugt is one of Denmark's leading fruit growers and one of Jimco's customers, who has installed, tested and purchased Jimco's new technology.



## Mixing apples and pears

In addition to the minimization of mould and yeast growth, the system has other benefits. It also reduces ethylene in the air, normally secreted by apples. This enables the possibility of mixing different fruit types. Normally, apples cannot be stored in the same cold storage rooms as a number of other fruits. However, the concentration of ethylene, which causes e.g. pears to rot faster, is minimized with the FLO-D® technology. Thus, new opportunities are offered for storage of different fruits in the same cold storage rooms. It is an advantage, because we can then close down a few cold storage rooms and gather various fruits together in the same room when the high season is coming to an end, says Morten Tønder.

## HYGIENE ON A LEVEL BETTER THAN TRADITIONAL DISINFECTION

At the fish factory Vega Salmon A/S in Esbjerg, Jimco's system for UV-C & Ozone-based disinfection has been installed in the production. Tests from the factory show that the total bacterial concentration after a UV-C & Ozone-based disinfection is better/lower than after a traditional disinfection.

At the same time, the concentration of fungal spores is reduced. This goes to prove that saving tons of water and chemicals has no hygienic consequences.



# COLD STORAGE

## KILL MOULD, YEAST AND ETHYLENE

- No need to use so many resources to effectively clean your cold store.
- Avoid premature wastage of your precious fruits.

JIMCO A/S has performed tests and analysis, depicting significantly lower concentration of both mould and yeast when using the FLO-D®.

## SAVE MONEY

The shelf life of food has always played an important role. For example, ethylene, mould and yeast shorten the time in which the food stays fresh. In the fruit industry, among other places, mould and yeast growth is a tough opponent affecting product lifespan. FLO-D® (photolysis oxidation disinfection) will help revolutionize the way fruit is stored. The FLO-D® uses UV-C-Technology

to kill the bacteria, mould and yeast in the cold storage, hence optimizing the lifespan of fruits.

### Cleans within a few hours

One FLO-D® unit is capable of cleaning a cold storage room of up to 1,500m<sup>3</sup> within a few hours.

## TREATMENT WITH & WITHOUT UV-C PRODUCED OZONE

With ozone



Without ozone



Grapes

With ozone



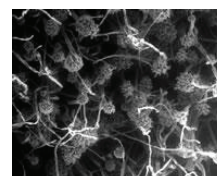
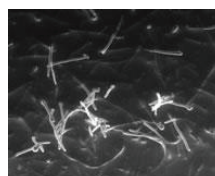
Without ozone



Strawberries



Oranges



Tomatoes



## TECHNICAL DESCRIPTION

### FLO-D®

**UV-lamps:** 30 pcs. 89 watt

**Quartz sleeve:** 30 pcs. (in cold storage)

**Power supply EU:** 3x400V + PE 50/60Hz, 16A

**Power supply US:** 3x480V + PE 50/60Hz, 16A

**Consumption:** 9 kW

**Display:** Siemens PLC, Proface color panel

**Treatment capacity:** Roomsize up to 1,500 m<sup>3</sup>

### Measurements:

Height 2,100mm

Width: 1,200 mm

Depth: 1,200 mm

Weight: 175 Kg



# FLO-D<sup>®</sup> MINI

NEW

## TECHNICAL DESCRIPTION

### FLO-D<sup>®</sup> MINI - Mark 2

**UV-lamps:** 8 pcs. 70 watt

**Quartz sleeve:** 8 pcs. (in cold storage)

**Power supply EU:** 1x230V + PE 50/60Hz, 10A

**Power supply US:** 1x115V + PE 50/60Hz, 10A

**Consumption EU:** 640 watt

**Consumption US:** 685 watt

**Display:** Proface PLC, color panel

**Room-volume:** Disinfection: Up to 314 m<sup>3</sup>

Odor treatment: Up to 1.258 m<sup>3</sup>

### Measurements:

Height: 1150 mm

Width: 560 mm

Depth: 890 mm

Weight: 59 Kg



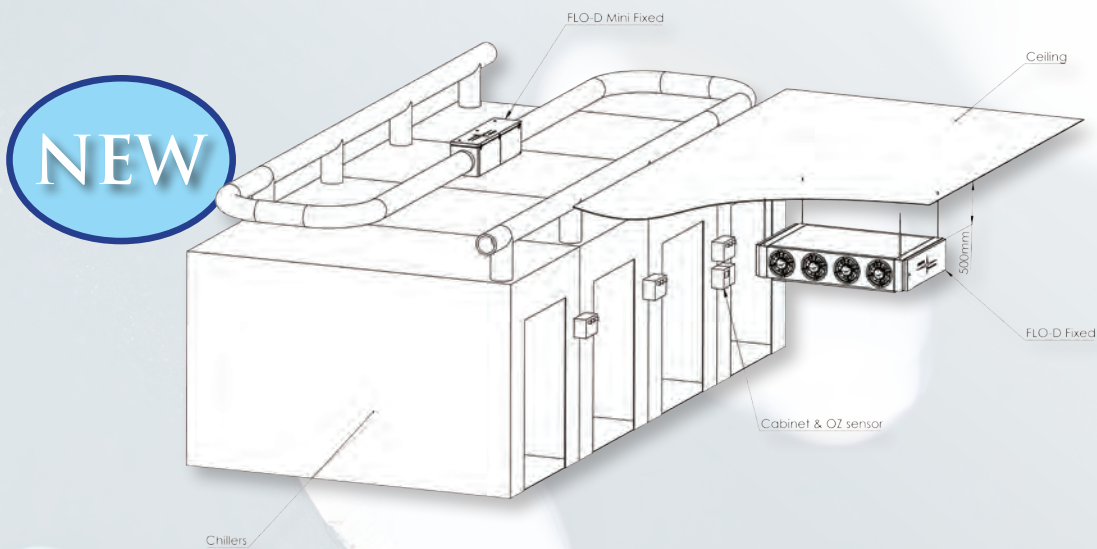
# FLO-D<sup>®</sup> FIXED

FLO-D Fixed, allows you to have any size of production area, no area is to big

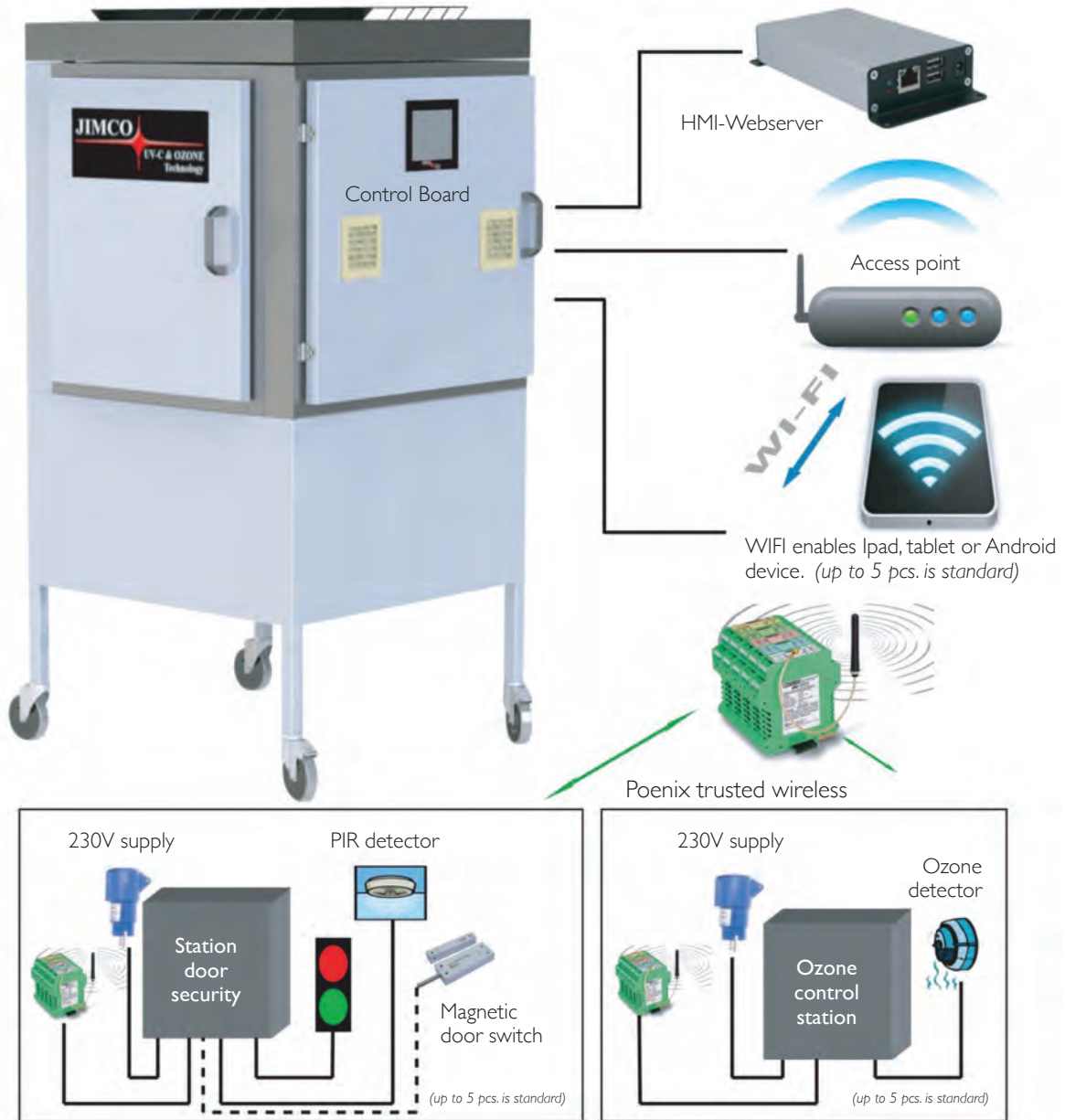
FLO-D Fixed is a development used for installation where absolute no failure is allowed, and more than one person has the responsibility of the disinfection

FLO-D Fixed also allows you to install the system in a pipe installation. As an example you can use one unit for disinfection of more chillers, by use of dampers.

Contact Jimco for more information on FLO-D Fixed



# FLO-D<sup>®</sup> TECHNOLOGY



- Each entrance is monitored by a PIR sensor or magnetic door switch.
- There are warning lamps at each input. Status of ozone levels can be read via FLO-D's website outside the room with a handheld Web browser (tablet, Iphone etc.).
- All signals from the doors and ozone sensor handled wirelessly. However, all stations must have a 230V supply.
- Single-station and measuring stations come with up to 5 pcs. per installation by default, but it is possible to connect more.

# TEST OF JIMCO FLO-D® DISINFECTION EQUIPMENT BASED ON UV-C/OZONE



## Aim of project

To investigate the bactericidal effect of UV-C produced ozone on chosen bacteria strains that are regarded as relevant contaminants in the food processing industry. Furthermore, it was desirable to determine a setting for the ozone concentration and the time of exposure, in achieving the desired effect.

## Experimental setup

The test was performed in a special designed ozone chamber, where the ozone concentration and the temperature were measured during the experiments. 10 µl of bacteria culture was applied on stainless steel plants and spread to an area of 1 cm<sup>2</sup>. The bacteria culture was diluted in sterile milliQ H<sub>2</sub>O to a concentration of 10<sup>5</sup>-10<sup>7</sup> cells/ml. The steel plates were incubated at room temperature for one hour until the applied culture had dried out. The plants were then placed in the ozone chamber and exposed to various ozone concentrations for time point.

Bacteria survival was measured by washing the applied area on the steel plates with 2x50 µl 0.9 % NaCl, which was obtained and spread on agar plates for CFU determination by overnight incubation at 37 °C. As a reference, the CFU of bacteria applied on stainless steel that were not exposed to ozone, was also performed. The experiments were performed at room temperatures that did not exceed 23 °C during the experiments.

## Conclusion

In these experiments, the largest effect was observed after two hours of exposure at 10 ppm. When the time exposure was reduced to one hour, or the concentration of ozone was lowered to 5 ppm, the reduction of bacteria was distinctively decreased. Furthermore, the effect of ozone was limited by the amount of bacteria applied on the steel plates.

When the level of bacteria exceeded 10<sup>5</sup> bacteria per cm<sup>2</sup>, the effect of ozone also decreased after two hours of exposure at 10 ppm.

However, with a reduction that is within the accepted range. Also, this amount of bacteria exceeded the level of what would be representative of well-cleaned food production facilities, which is the premise for the application of the device.

Exposure time	Ozone concentration	Loaded CFU/cm <sup>2</sup>	Control CFU/cm <sup>2</sup>	Ozone CFU/cm <sup>2</sup>	Reduction
2 hour	10 ppm	2,40E+03 (2400)	4,00E+00 (4)	0,00E+00 (0)	
		3,30E+03 (3300)	8,00E+00 (8)	0,00E+00 (0)	
		3,00E+03 (3000)	7,00E+00 (7)	0,00E+00 (0)	
			1,60E+01 (16)	0,00E+00 (0)	
	Average	2,90E+03 (2900)	8,75E+00 (8,75)	0,00E+00 (0)	100,00%
2 hour	10 ppm	2,00E+04 (20.000)	3,00E+00 (3)	0,00E+00 (0)	
		2,00E+04 (20.000)	1,40E+01 (14)	0,00E+00 (0)	
		2,00E+04 (20.000)	2,80E+01 (28)	0,00E+00 (0)	
			1,50E+01 (15)	0,00E+00 (0)	
	Average	2,00E+04 (20.000)	1,50E+01 (15)	0,00E+00 (0)	100,00%
2 hour	10 ppm	3,60E+04 (36.000)	3,00E+01 (30)	0,00E+00 (0)	
		2,20E+04 (22.000)	1,13E+02 (113)	0,00E+00 (0)	
		2,60E+04 (26.000)	3,40E+01 (34)	0,00E+00 (0)	
			5,90E+01 (59)	0,00E+00 (0)	
	Average	2,80E+04 (28.000)	5,90E+01 (59)	0,00E+00 (0)	100,00%
2 hour	10 ppm	3,60E+05 (360.000)	3,98E+02 (398)	0,00E+00 (0)	
		2,20E+05 (220.000)	2,85E+02 (285)	1,00E+00 (1)	
		2,60E+05 (260.000)	2,97E+02 (297)	0,00E+00 (0)	
			3,27E+02 (327)	3,33E-01 (0,33)	99,90%
	Average	2,80E+05 (280.000)	3,27E+02 (327)	3,33E-01 (0,33)	99,90%

# From O<sup>2</sup> to O<sup>3</sup> to O<sup>2</sup>

Article from MEAT & CO  
Holland February 2017

Anyone working in the production of fish is faced with the *Listeria* bacteria which is common in fish. Always and in the whole process.

After several years of disinfecting with chlorine, related products, a lot of water and a significant time investment, Axel Verberckmoes from Levenstond Seafood went looking for a better solution.

He ended up with the ozone solutions from Jimco and began a cooperation with Baaijens Industrial Equipment from Oss.

Safe processing with the ozone solution from Baaijens



## Baaijens and Jimco

Baaijens Industrial Equipment is the exclusive supplier for the Benelux for Jimco. Jimco sells various air cleaning systems with UV-C and ozone technology and is thus specialised in the elimination of micro-organisms and scents. Baaijens supplied and installed three FLO-D® units at Levenstond Seafood.

The machine is as follows: by means of light, oxygen is converted into ozone, a process which, in this case, is reversible.

That means that neutral air is emitted again.

This technology is applicable in the complete food industry.



Levenstond Seafood was established in 2007 when founder Axel Verberckmoes had the intention to process salmon for Delhaize with about 10 employees. In 2017, the Belgian company processes 5,000 tonnes of fish per year into 30,000 consumer packages per day, in two production departments, four cash&carries and two sourcing platforms, one of which is in Vietnam. The family company serves almost the whole retail sector in Belgium, including Delhaize, Colruyt, Spar, Carrefour, Lidl and Aldi.

## Domotics for the industry

Besides Levenstond Seafood, the group of family companies consists of Vandermaesen which was taken over in 2012 and LSF Services, which was created out of necessity.

Axel: "Nowadays, as a food company, you can no longer do without IT. It has become a huge expense for companies. The work is often outsourced as the companies themselves do not have enough know-how. It is expensive and the result is often insufficient. We are talking about links, control, ERP software and so on.

As a food company, you have a huge amount of obligations. You must be able to pass on information to your customers. Retailers are demanding because the market requires them to be. To this end, we have established LSF Services, which focuses on domotics for the food plant."

## Ozone based cleaning

Axel: "When you process fish, every day again you introduce *Listeria* to the production process. That is inherent to the product. At the start, we have set up a system to disinfect with chemicals. First cleaning, then disinfecting with a disinfectant product, such as chlorine. That works, but that only cleans the surface and machines require more. They have holes and gaps. After several years, it has emerged from testing that it is becoming more and more difficult to obtain good results. That is why we actively went in search of a better solution. We got into contact with the people from Baaijens, who presented us with a device based on ozone, which ensures that, in fact, the whole area, each hole, and even the air is sterilised. This was the device from Jimco, of which we now have three. A fantastic investment!"

## From O<sup>3</sup> to O<sup>2</sup>

When working with ozone, the air in the room is changed into O<sup>3</sup> and poisoned, if it were. This demands a lot from the organisation. Axel: "You must ensure that at that moment, nobody can enter; that the cleaning is timed and measured and that you can report afterwards. So, the device by itself, which is a standalone device, is a part of the solution. Because we have LSF Services, we started talking with Marc Baaijens to turn the standalone solution into a complete concept, which makes the system user-friendly. The devices from Jimco are amazing. We gain a lot of time in the cleaning process, use half of the water; do not use chemicals and thus work more environmentally friendly and business safer. In addition, the results are available online and always very good. Above 7 ppm we know we have cleaned well, but we are always above it. You also note from the results that the cleaning gets better and faster. While initially, it took seven to eight hours to achieve a good result, now it is done in two to three hours." Axel adds: "It is important to note that the process of converting to ozone, to O<sup>3</sup>, is reversible. After a few hours, we emit neutral air again."

## Good match

To achieve this optimal result, there was intensive contact with both the staff from Baaijens and the engineers from Jimco. Axel: "It was an empirical process of trial & error. The cooperation with Baaijens turns out to have been a great choice. They are competent people who have guided the whole process very well. Baaijens played a large, important role in the testing. It was pioneering work for the engineers from Jimco as well, because they have not been working on this that long yet."

## Proactive with FAVV

"The Belgian FAVV and the Dutch NVWA are often approached with suspicion", Axel believes.

"But when you approach them proactively and talk with them, the contact is often fine. That is what we did when we started cleaning with the Jimco FLO-D. We also brought our test results straight away. The FAVV is very positive about our company and the results. Which are simply wonderful. This investment pays back within one year."





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