

JIMCO[®]

UV-C & OZONE
Technology



DISINFECTION WITH FLO-D[®] TECHNOLOGY

FLO-D[®] MINI

DANISH DESIGN & TECHNOLOGY - FOR THE FUTURE

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.



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.

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.

FLO-D® MINI

NEW

TECHNICAL DESCRIPTION

FLO-D® 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 m³

Odor treatment: Up to 1.258 m³

Mesurements:

Height: 1150 mm

Width: 560 mm

Depth: 890 mm

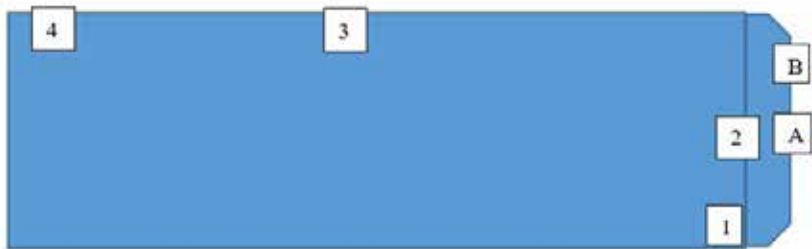
Weight: 59 Kg



COOLING TRAILER TEST

1. Ozone treatment in 3 hours with FLO-D mini would reduce the amount of organic matter in which bacteria thrive and reproduce.
2. That, without other means, we get an ozone flow through evaporating the unit, so that there is also a reduction of organic matter.
3. Reduction or removal of odors.

The FLO-D mini produces Ozone by draining the air in the room through the system's UV-C chamber where oxygen O₂ contained in the air is converted to ozone O₃. The ozone then blows out and spread into the room.



Position	Start ATP	15 seconds ATP	60 seconds ATP	Remarks:
1	2463	101	71	OK
2	2471	111	9	OK
3	2788	90	62	OK
4	1786	106	56	OK
A	1216	106	75	OK
B	1556	199	87	OK

There was a **SIGNIFICANT** reduction of fish smell after treatment, the trailer was left in the workshop overnight, which without ozone treatment usually means no one can keep the smell of fish out at the workshop and it is normal practice to pull chees / fishing trailers out at night.

Mini FLO-D settings: blower speed 80%, Ozone measurement upper ozone limit 9 ppm lower limit 8 ppm - hours ON - 03 hours 00 minutes.

AUTOMATIC DISINFECTION OF COLD STORAGE

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.

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® (photolytic 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 1,500m³ within a few hours.

TREATMENT WITH & WITHOUT UV-C PRODUCED OZONE

With ozone



Without ozone



Grapes

With ozone



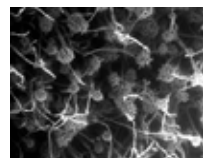
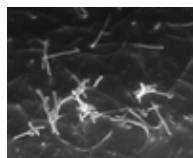
Without ozone



Strawberries



Oranges



Tomatoes

FLO-D[®] TECHNOLOGY

Control Board



Ozone measuring unit



Access point

WIFI enables Ipad, tablet or Android device. (up to 5 pcs. is standard)



- ✓ Easy to maneuver from room to room.
- ✓ Disinfect all places where air are in touch.
- ✓ Access point for wireless connection by smartphone/tablet.
- ✓ All valued data is logged for later analytic use.

SURFACE DISINFECTION AND ODOR 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 odors 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 ahead

By simple use of the mobile FLO-D® air cleaners, you will quickly and effectively disinfect and remove unpleasant odors 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.

REPEATEDLY DELIVERING POSITIVE RESULTS

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.

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 cm². The bacteria culture was diluted in sterile milliQ H₂O to a concentration of 10⁵-10⁷ 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.

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 10⁵ bacteria per cm², 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	Control	Ozone	Reduction
		CFU/cm ²	CFU/cm ²	CFU/cm ²	
2 hours	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 hours	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)	
	Average	2,00E+04 (20.000)	1,50E+01 (15)	0,00E+00 (0)	100,00%
2 hours	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)	
	Average	2,80E+04 (28.000)	5,90E+01 (59)	0,00E+00 (0)	100,00%
2 hours	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)	
	Average	2,80E+05 (280.000)	3,27E+02 (327)	3,33E-01 (0,33)	99,90%



UV-C AND OZONE SOLUTIONS FOR THE FUTURE.

EUROPE · SOUTH AMERICA · USA · ASIA · MIDDLE EAST · AFRICA

JIMCO TECHNOLOGY USERS



Line ID : AS FRIIS LTD



AS Friis Ltd.

34/11 Phatthana Wet 8, Sukumvit Soi 71, Khwaeng Phra Khanong Nuea, Watthana, Bangkok 10110

Tel: +66 20 95 56 95, Fax: +66 20 95 56 90, email: info@as-friis.com, Website:www.as-friis.com