



'Ducted' Coolstore SYSTEMS



OZONE TREATMENT FOR THE PREVENTION OF

- Fruit loss during storage
- Quality failures at outturn
- Ethylene Control





Bio-cool Systems (BCS) is a New Zealand based company that specialises in technology for fungal, bacterial and ethylene control in fruit and produce storage facilities.

The BCS product is a stand alone device operating totally independently providing operators a simple cost effective solution.

Features:

- Manufactured in New Zealand
- 24 hour ozone control & display
- Fully automated atmosphere management
- Independently located sensor
- Optional real time data logging
- Variable operational settings
- Micro processor controlled
- Simple plug in play operation
- Single phase power point
- Monitoring outside the coolstore

Benefits:

- Removes Ethylene
- Coolstore disinfection
- Leaves no residue
- Controls fungus, bacteria, spores
- Totally mobile by a single person
- Increases storage life of produce
- Reduces Fruit loss during storage
- Prevents Quality failures at outturn
- Removes odours
- Very cost effective



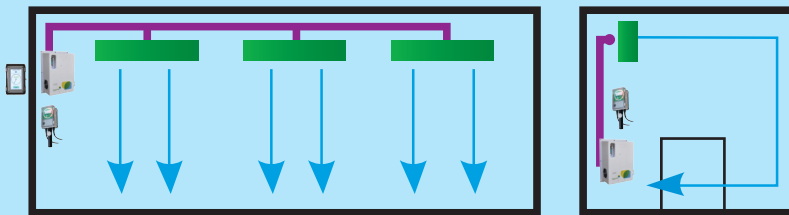
LEFT: Bio-cool Sensor & Ozone Unit, easily mounts to wall & feeds Ozone to Ducting



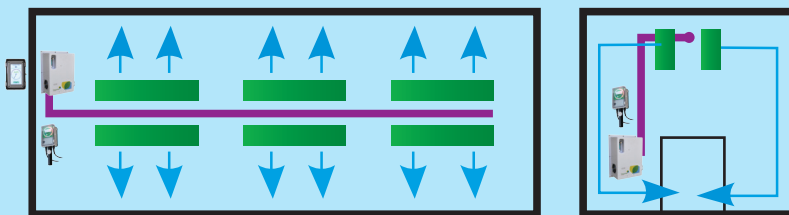
RIGHT: LCD Monitor - Displays Ozone levels and operational information outside the coolstore



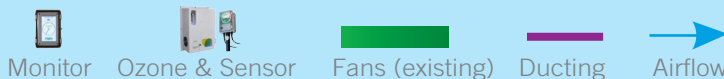
Coolstore Fan Layout # 1 - Floor plan & End view



Coolstore Fan Layout # 2 - Floor plan & End view



Key:



Bio-cool ozone unit - wall mounted & feed to ducting

How the Bio-cool Coolstore Unit Works

The BCS system has been designed for simplicity with fully automated processes delivering controlled ozone doses into the rooms airflow. This process utilises the existing airflow system within the Coolstore fed via PVC ducting with uniform exit holes, distributing ozone evenly to the back of all of the fans to maximise complete mixing and accurate control. Ozone attacks ethylene as it is being produced removing the triggering process for fruit and produce while providing high performance fungal and bacterial control.



BCS Operational Safety Policy

IS OZONE SAFE

If ozone was not safe, we would not be able to go outside and breathe the air, especially during sunshine, a thunderstorm, lightning, or after the rain. The fact is, when used responsibly, ozone is very safe just like oxygen and very beneficial to our planet for human survival. BCS systems are fully automated to maintained safe operational levels for operators and staff.

BIOCOOL OPERATIONAL SETTINGS

100ppb : at this concentration the ozonated area is safe to work in while still providing effective sanitising, bacterial and ethylene control. Note: some people, particularly asthmatics, may find even this level is an irritant to airways so should avoid entering the area.

100ppb (0.1ppm): the maximum allowable concentration in industrial working areas where people are present.

200ppb: is the maximum setting of unit and is recommended for the treatment and sanitising of rooms. Ensure the coolstore is contained and no staff are present. On completion turn unit off and ventilate room before re entering.



What is Ozone

Ozone is in the atmosphere operating as a natural disinfectant. It occurs naturally in the environment and is simply activated oxygen – think of the fresh smell following a thunderstorm.

Ozone works as a natural cleaner. When it comes into contact with an odour (a volatile organic compound) a chemical reaction takes place and the odour oxidises into a harmless, non-odorous substance.

It is not a masking process – the smells are removed permanently.

Ozone also works as a natural sanitising agent.

It kills all bacteria, pathogens and viruses, including E-Coli and MRSA, and leaves treated areas hygienically clean.

Ozone Facts

- Ozone is made up of 3 atoms of oxygen. The air we breathe contains only 2 atoms.
- Ozone is a naturally occurring substance formed by elements already found in nature.
- Ozone has been shown to be more powerful and more effective than chlorine, particularly on the more resilient bacteria.
- Ozone leaves absolutely no residual element. It reverts back into oxygen and carbon dioxide and simply dissipates into the air with no lasting harmful side effects and no environmental degradation.

Biocool Ducting

Biocool Ducting

Biocool Sensor & Ozone unit

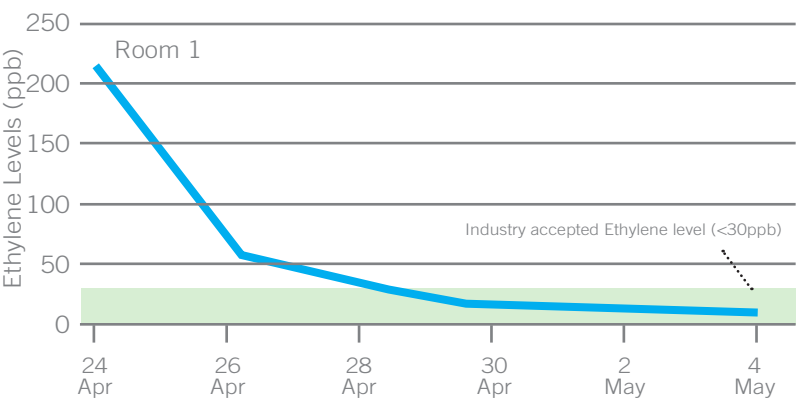
24 hour Ozone Level Control & Display

Display Monitor showing Operational safety level - 86 ppb

An integral part of the Bio-cool unit is the 24 hour LCD control & display monitor. A manual and initial operational training is provided to explain how to use the Ozone time clock/controller and change its settings.

The two operational settings can be programmed to perform at different times of the day to work in with coolstore production hours. Ozone levels are displayed at 1 minute intervals to confirm workplace safe operational levels.

Ethylene trial on Kiwifruit - April 2013



SUMMARY

This trial was conducted by Bio-cool Systems to confirm effective ethylene reduction. This included fruit of varying ripeness.

To confirm the ethylene was being produced rapidly the Bio-cool unit was turned off for a period of two days after this trial. The ethylene level increased significantly from below 10ppb to 36ppb within 60 hours. The system was then turned back on reducing the ethylene level back to below 10ppb within 48 hours.

Verified Lab Services Results - October 2012

SAMPLE #	SWAB ID	GROWTH ON TSA PLATE	GROWTH ON BAP	GROWTH TYPE
1	BG01	G	G	Bacterial
2	OBG01	NG	NG	N/A
1	BC01	G	G	Bacterial
2	OBC01	NG	NG	N/A
1	BL01	G	G	Bacterial
2	OBL01	NG	NG	N/A

RESULTS

Morphological characteristics:

Growth of bacterial colonies was seen on BAP and TSA plates for swab samples BG01, BC01 and BLO1.

No growth was seen on BAP and TSA plates for OBC01, OBL01 and OBG01.

Key: Growth – G No Growth –NG BAP-Blood Agar Plate TSA-Tryptic Soy agar

● Grapes
 ● Cherries
 ● Lemons

Figure 1

