

# BIO-FOULING CONTROL ON MARINE VESSELS WITH OZONE

A recent pilot study on how to control accumulation of marine organisms on heat exchangers of marine vessels show that applying ozone is both effective and sustainable.

## Large economic impact

Marine bio-fouling, or accumulation of marine organisms on heat-exchangers for cooling systems, is a challenge in the maritime sector and has both an economic and environmental impact. Worldwide the cost of bio-fouling amount to tens of billions of euros each year.

This marine growth, often blue mussels, thrives on heat-exchangers and pipes that are in constant contact with seawater. Bio-fouling has an impact on both vessel safety, as it reduces the capacity of the cooling system, as well as on the protection of unique marine environments around the world.

## Environmentally friendly solution

Normex, a Norwegian water treatment company, set out to develop an ozone based bio-fouling prevention system for marine vessels. During the system tests

Normex validated the performance in preventing settlement of marine organisms on the inlets to the sea chest and the heat exchanger at different ozone doses. During the validation they also monitored the formation of bromates.

## Ozone a long-term solution

The result of the validation was quite clear - the ozone removed the existing organic growth and then kept the whole system ie sea chests, heat exchangers and piping clear from blue mussels. A constant low level of ozone is a sustainable solution both economically and environmentally.

The level of bromates generated under ozonation was more than 300 times less than what is considered to be hazardous to aquatic life.

No surplus ozone was detected in the cooling system at these levels of ozone dosage.

## BIOFOULCONTROL-PROJECT

The project was initiated by the coordinator, Normex AS (Norway) and funded by EU's FP7.

The objective of the BioFoulControl project was to develop an ozone based bio-fouling prevention system for heat exchangers in maritime seawater coolers.

## OZONE FOR BIO-FOULING ON MARINE VESSELS

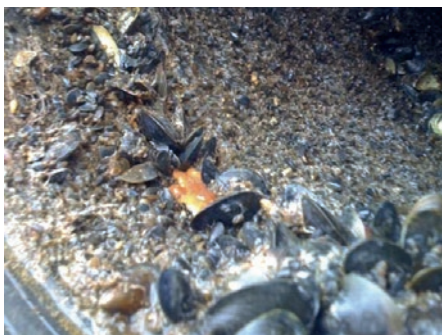
- > Large economic impact
- > Proven success rate for removal of marine organisms
- > On-site production
- > No chemicals needed
- > Environmentally friendly

## PRIMOZONE CONTRIBUTION

Primozone SM100 - complete and movable ozone system designed for pilot testing, including oxygen generator, compressor and ozone generator.

## OTHER APPLICATIONS

- > Marine cooling systems
- > Offshore rigs
- > Aquaculture
- > Power plants
- > Desalination plants



## ABOUT PRIMOZONE

At Primozone® we are committed to provide our customers with cost efficient and environmentally friendly ways to clean and treat water with ozone. Our ozone generators and ozone water treatment systems are based on cutting-edge technology and generate far more ozone while using far less energy.

At Primozone we have found an innovative way to make ozone generation efficient and cost effective.

Our solution has proven to save up to 70% of the energy consumption compared to traditional ozone generators. Furthermore the Primozone Ozone Generator is small and has the capacity to generate ozone with a proven high concentration.

Ozone is not only a natural product but also one of the most efficient methods to clean and treat water.

### [www.primozone.com](http://www.primozone.com)

Primozone began redefining ozone technology in 2000. Since 2003, Primozone Production AB has been wholly owned by Westfal-Larsen Technology of Bergen, Norway. Today Primozone's patented technology is used in water treatment installations in more than 40 countries worldwide.

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