APPLICATION SHEET | COOLING TOWERS WATER SYSTEM

OZONE - ONE SOLUTION FOR MULTIPLE COOLING TOWER WATER TREATMENT CHALLENGES.

For almost 30 years, ozone has been used to remove and prevent the growth of these organisms while reducing contaminant levels (e.g. AOX and COD) through direct oxidation. Contrary to conventional halogen-based biocides, ozone does not produce unwanted by-products such as halocarbons (AOX).

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Cooling systems operations entails extensive treatment as it provides an idyllic growth environment for bacteria, Legionella, algae, fungi and molluscs which can adhere to the pipeline, heat exchanger and cooling tower surfaces.

Three main areas of concern are identified:

- Scaling in heat exchanger units and pipes
- Corrosion of pipes and heat exchanger units
- Bacterial and Microbial growth

Malpractices in these areas can lead to reduced heat efficiency and potential overall system failure. Important to note that these facets must be addressed together as fixing one aspect might lead to augmented failure in the other one, an example of higher corrosion level of metals by lowering water Ph levels to inhibit scaling.
Ozone acts as one solution to all these aspects without the need to keep experimenting with different chemicals.

WHY OZONE IN COOLING TOWERS - EXPLAINED.

Ozone is produced on-site from oxygen gas and is introduced directly into the cooling water via sidestream injection. Ozone may also be injected directly into the cooling tower reservoir.
Once it is dissolved in water, ozone proceeds to oxidise organic contaminants and microorganisms. The ozone dosing is regulated automatically by the control system of the ozone generator and varies with the water demand. Ozone, combined with suitable corrosion and scale inhibitors, provides the optimum treatment solution for cooling water.

Some of the advantages with ozone:

- The most powerful disinfectant
- Very effective control of Legionella
- Blow down water complies with strictest standards for AOX and COD
- Microorganism growth is prevented
- Cleaning downtime reduced
- No harmful by-product formation
- No storage/handling of hazardous chemicals or biocides
- Easy integration in existing plants

AREAS OF CONCERN:

- Scaling in heat exchanger units and pipes
- Corrosion of pipes and heat exchanger units
- Bacterial and microbial growth

FACTORS TO CONSIDER:

- Retention time
- Optimal circulation to avoid dead spots
- Temperature
- Ozone resistent materials

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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WHY PRIMOZONE OZONE?

Robust and reliable ozone technology

The key reason why Primozone ozone solution is exceptional for cooling water towers is its robustness and reliability. It should not be acceptable any longer for operators and users to have stops in operations because the cooling system is unsafe (Legionella) or inefficient (biofouling formation).

Compliance with Strict safety regulations of the cooling tower environments

Cooling towers environment is famous to have strict safety rules and regulations, so leakage of flammable gas into power plant environments should be avoided at all cost, here is where Primozone's patented way of distributing the gas into the enclosure, through the gas-tight anodized aluminium framework, is a guarantee against leakages in the ozone generator.

Reduced maintenance costs

Cooling towers are usually installed in remote locations, unless there is full-time personnel on site dedicated to the water treatment system (which is an extra expense), sending someone to site for maintenance, repair and regulation is not optimal as it takes time and involves additional costs. The Primozone system has no preventive maintenance need, and it is fully automated, hence remote monitoring and regulation is possible.

Full automation

Full automation makes things easier in environments where not all the personnel is experienced in operation of water treatment equipment.

Plus, the Primozone Human-Machine Interface is so user-friendly that operation and diagnostics are straightforward, even if done manually.

Smallest footprint

In the cooling towers case, the ozone system is usually to be installed in its building, so the compact footprint of Primozone technology comes in very handy. The system is so small that it might be containerised.

Long distance ozone distribution

This building/container often has to be placed quite far from the injection point. In these conditions, the naturally high outlet pressure of the Primozone ozone gas is fundamental to be able to distribute the ozone on a long distance.

High pressure is useful also because recirculating water in cooling towers is pressurised. Unless you choose Primozone, it's most likely not possible injecting the ozone directly in water – you must use a Venturi injector. If water pressure is above 3bar(g) and a Venturi injector is needed in any case, with Primozone high concentration the injection system will be much smaller, much cheaper and much less energy consuming than with traditional low concentration.

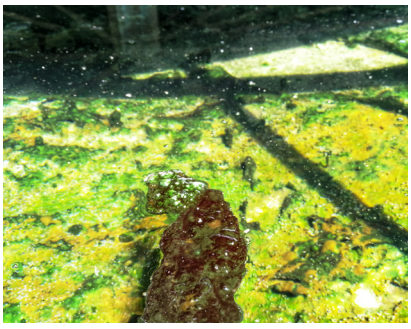
OPEX savings from day one

Last but not least, power plants pay a low cost for electricity. Oxygen instead won't likely be available in the immediate surroundings of the plant and might be very expensive. That's when powering up the generator and running at high concentration can lead to significant OPEX savings.

BENEFITS OF OZONE IN COOLING WATER TREATMENT

- Ozone improves chiller performance – enhancing the ability of heat exchangers to transfer heat
- Small amount of ozone as a biocide eliminates almost all mineral solids and organics – saving the water
- Eliminates/ taking down the amount of chemicals use
- Ozone leaves no residues and will not be found in the blown down water – compliance with regulations.
- No extra sewage fees to discharge the blown down water
- Ozone will not alter the rate of evaporation
- Ozone reacts as a descaling agent, which decomposes the biofilm
- Reduced health risk to personnel. gent, which decomposes the biofilm

* 1994 Ashrae Handbook, Equipment Volume, Chapter 20, Cooling Towers, American Society of Heating, Refrigerating,



Moss and biofouling in thhe basin of the cooling tower.

SOME OF PRIMOZONE REFERENCES

- Uniper
- HEQI, China
- LINDE, Germany

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