

**Introduction to
ALTRET 2532-Two
components ClO₂ in
powder form**



Outlines

What is Chlorine dioxide ?

What is advantages of Chlorine dioxide vs other biocides?

Biofilm removal action of Chlorine dioxide

Chlorine Dioxide by ALTRET 2532 Signification & method

Testing method of ALTRET 2532

Conclusion

What is Chlorine dioxide ?

Greenish-Yellow Color, Similar Smell to Chlorine

Highly Soluble in Water

- Does not hydrolyze like Cl_2 : no loss of effectiveness at higher pHs
- Kills bacteria, spores, viruses, fungi, algae very fast and no immunity development
- It can diffuse into biofilms attacking the bacteria generating the biofilm

Reacts by Oxidation (Select Oxidizer)

- No loss of biocide effectiveness due to byproduct reaction
- No byproduct AOX or THMs

Cannot be Compressed or Shipped

What is advantages of Chlorine dioxide vs other biocides?



Advantages of ClO₂ over Cl₂ / Hypo

Very fast rate of disinfection

Excellent control of bio-films

Effective at low dosage rate

Non Reactive with Organics (THM or HHA, Low TOX, Low stable consumption)

Does not react with ammonia (low and stable consumption)

Slow bacterial recovery after disinfection

Disinfection less dependent on pH (stability, economy)

Significantly lower corrosion rate

Safer handling/storing

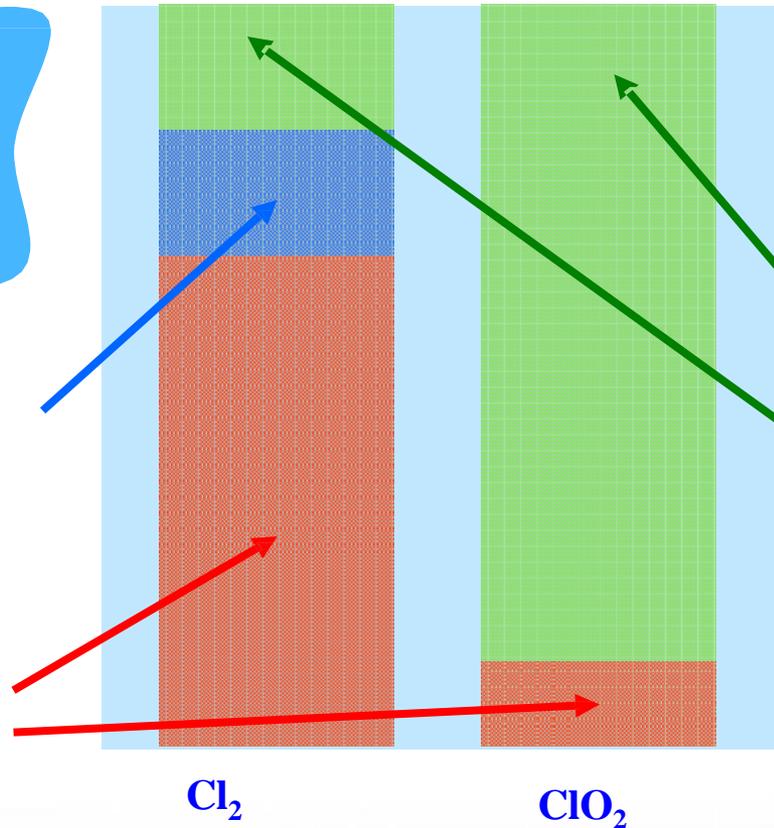
Why Use ClO₂ - Selectivity



How chemistry impacts dosage requirements

Amount 'inactivated' by pH effects

Amount consumed by organics



Amount available for Disinfection

Property	Hypochlorite	Chlorine Dioxide
Active species	HOCl Hypochlorous acid OCl ⁻ Hypochlorite ion	ClO ₂ Chlorine Dioxide
Disinfection efficacy with varying pH	Powerful <7.5 Decreasing 7.5 - 8.2 Reduced above 8.2	Powerful 6 - 10
Disinfection by-products of environmental concern	Forms trihalomethanes, adsorbable organic halogens and non purgeable organic halogens	None
pH impact of dosing	Increase Excess caustic in solution (pH 11-12)	Slight decrease Excess acid in solution (pH 1-3)
Reaction with Natural Organic Matter	Rapid Forms chlorinated organic compounds	Intermediate Forms oxidised organic compounds
Reaction with ammonia	Reacts to form chloramines which are poor biocides and highly toxic to aquatic life	No Reaction
Reaction with biofilm	Fair	Excellent
Product Stability	Poor Degrades readily	Good Generated on site

Chlorine Dioxide Oxidation Potential

Oxidant Species	Oxidation Potential, Eo(V)	Oxidation Capacity
Ozone (O ₃)	2.07	2 e ⁻
Hydrogen peroxide (H ₂ O ₂)	1.76	2 e ⁻
Permanganate ion (MnO ₄ ⁻)	1.68	3 e ⁻
Hypochlorous acid (HOCl)	1.49	2 e ⁻
Chlorine (Cl ₂)	1.36	2 e ⁻
Hypobromous acid (HOBr)	1.33	2 e ⁻
Bromine (Br ₂)	1.07	2 e ⁻
Chlorine dioxide (ClO ₂)	0.95	5 e ⁻
Sodium hypochlorite ion (NaOCl ⁻)	<0.50	2 e ⁻

ALTRET 2532 Chlorine Dioxide Chemistry:

ClO₂ does not react with water

It changes chemical form or changes in pH with biocidal activity.

**Not react with treatment chemicals present in the cooling water
(phosphate, phosphonate ,Azole or Zinc)**

Unchanged even after changing condition of cooling tower.

Run effective at stress water chemistry

Biofilm removal action of Chlorine dioxide



The Biofouling Problem

MICROFOULING



- Bacteria, Algae, Fungi,
- Microbial corrosion
- Loss of the heat exchange (loss in the efficiency of the thermal cycle)

MACROFOULING



- Mussels, Barnacles, Serpulid worms, Hidroys
- Encrusting, loss of water flow, tubes plugging corrosion under deposit.

The Biofouling problem

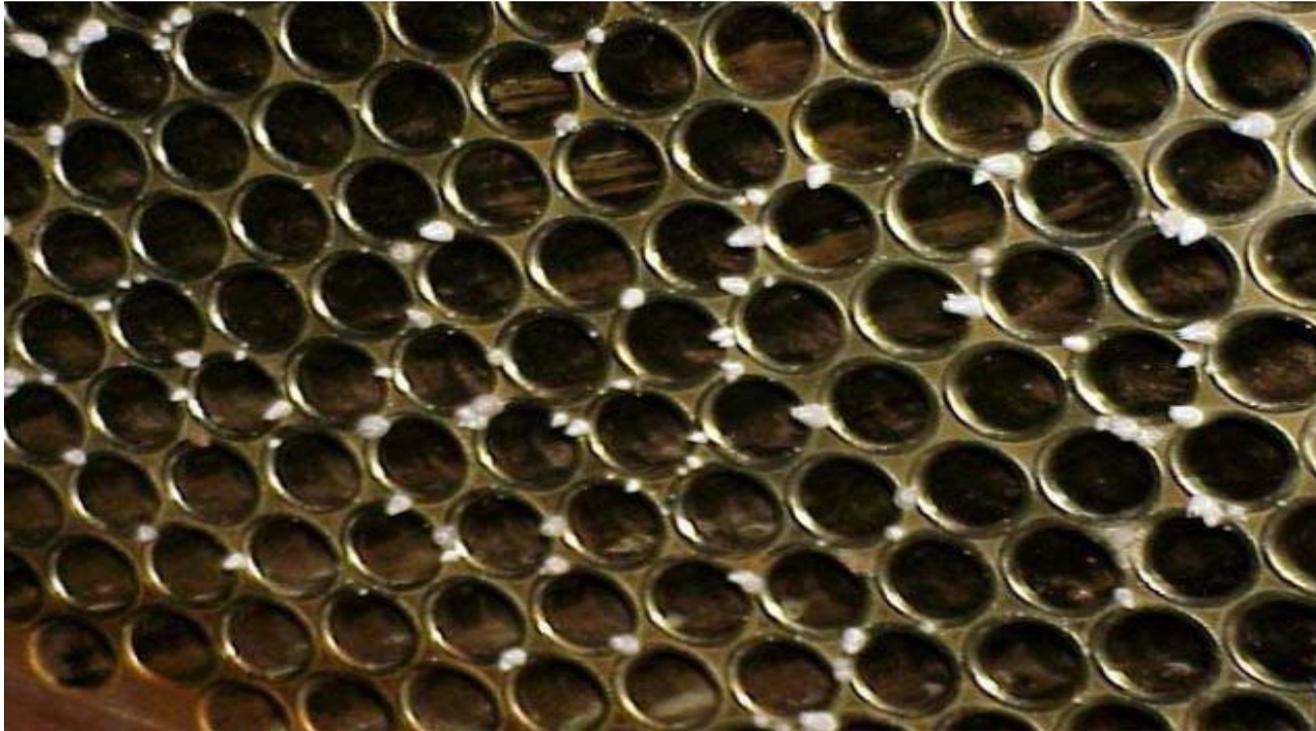


Heat Exchanger Treated with Chlorination



Heat exchanger treated with chlorine

Heat Exchanger Treated with Chlorine Dioxide

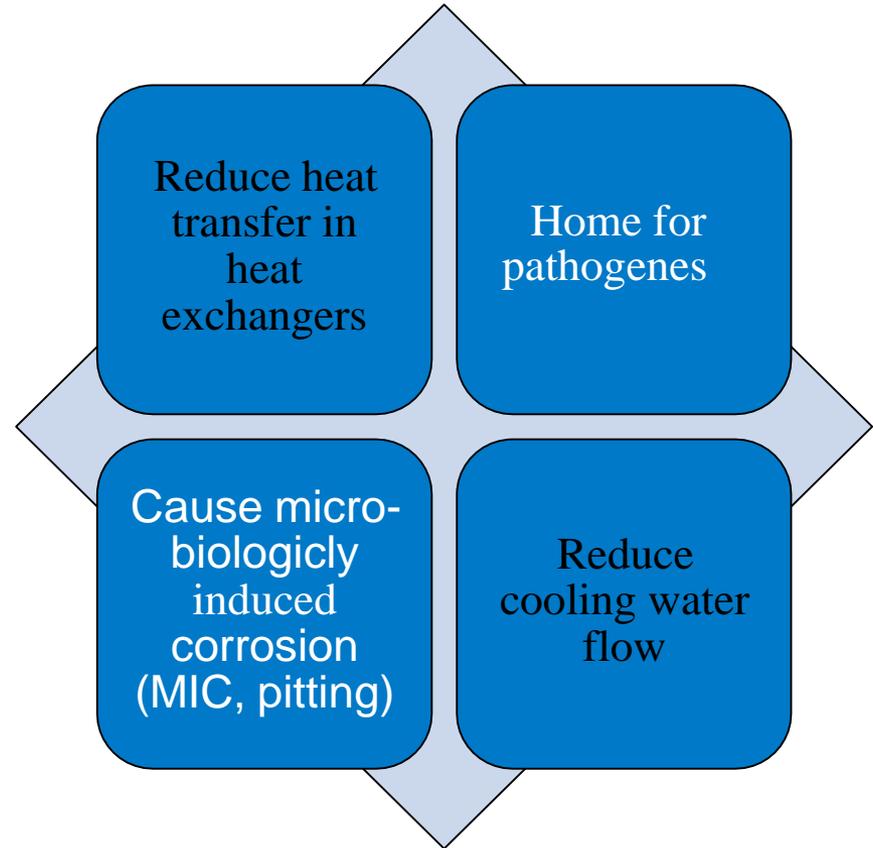


Heat exchanger treated with Chlorine Dioxide

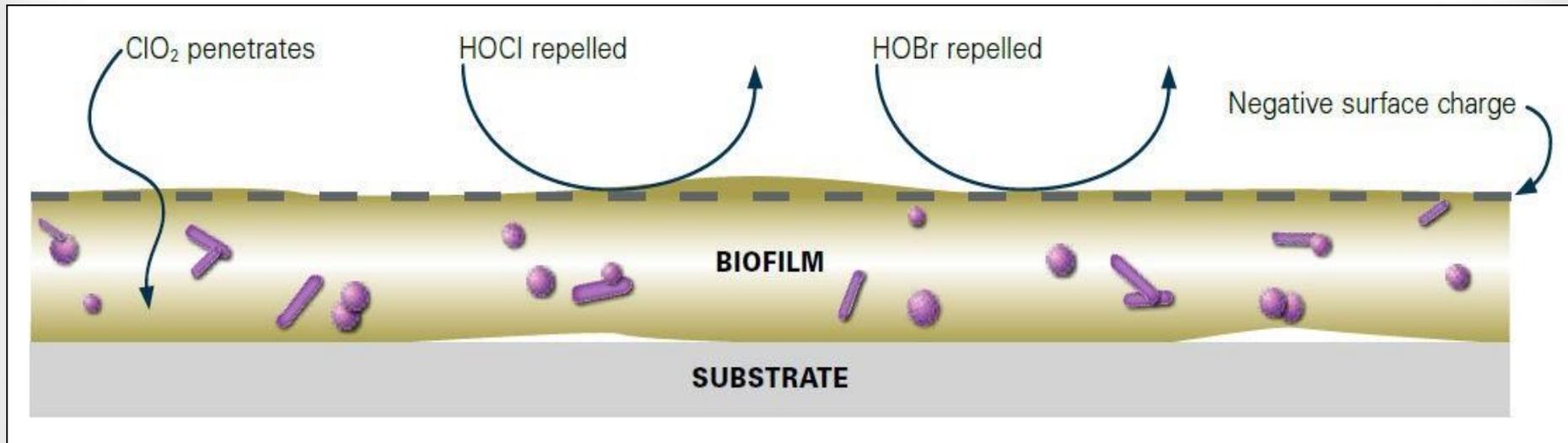
The Menace of Bio-films



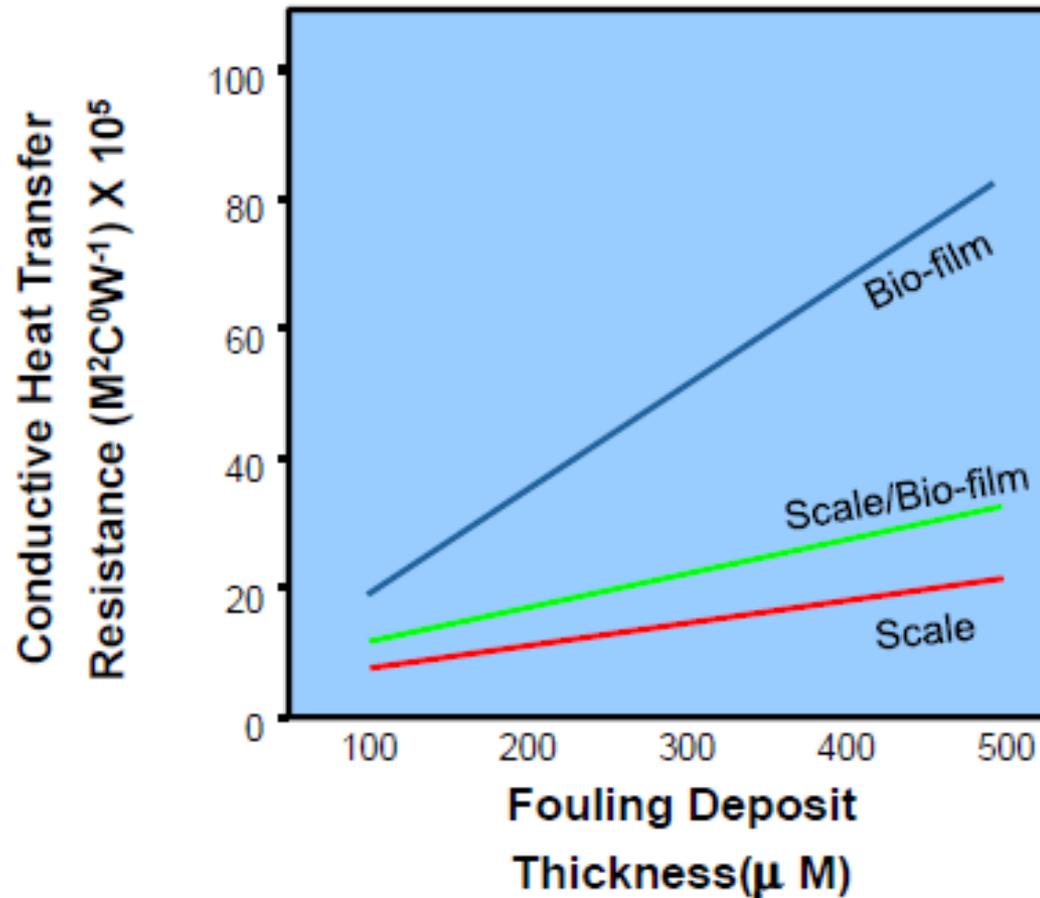
- Because ClO_2 is a true dissolved gas in solution.
- It can rapidly diffuse and penetrate the polysaccharide based biofilm substrate, killing microbes both throughout and beneath the biofilm.



Killing Mechanism of Chlorine Dioxide



Effect of Heat Transfer because of Biofilm



Chlorine Dioxide by ALTRET 2532 Signification & method



What is ALTRET 2532 ?

Technically advanced Two component based chlorine dioxide (ClO₂) delivery system.

Developed for quick & easy way of producing high purity ClO₂ without the need for specialist equipment

ALTRET 2532

Comprises two separate components that are mixed together in water to create an activated, high purity solution of ClO_2 (min. 0.50%)

Very cost effective method of generating chlorine dioxide with minimal up-front investment costs in plant, equipment and training

Does not require acid activators, nor does it build chlorite or chlorate

No release of free chlorine, chlorite, chlorate and chloride

Safe, Effective, Non-Hazardous

Applicable for drinking water

Preparation Method:



Water



Water + ALTRET 2532-A



Water + ALTRET 2532-A + ALTRET 2532-B



Ready to Use

Methods for producing ClO₂ Solution

Fill the normal water in specified pot or container.

Add ALTRET 2532-A at recommended dosage in water gradually.

Add recommended Component-B gradually in container

Stir it well and allow to put container close at least for four hours

ALTRET 2532 (0.5% solution of chlorine dioxide) is ready to use.

Ensure good ventilation / exhaustion at the workplace

Keep it in a dark & cold place.

Testing method of ALTRET 2532



Testing method of ALTRET 2532

Modified DPD method is ideal to test ALTRET 2532 (0.5% ClO_2)

Alternatively CPR (chloro phenol red method) can be used.

ALTRET 2532 Treatment

Calculation of ALTRET 2532 dose:

- Quantity of **ALTRET 2532** = (Recommend dosage / 5000) * holding capacity of Cooling tower.

Regular Treatment:

- For regular treatment, **ALTRET 2532** repeatedly dose to maintain ClO₂ residue @ 0.1 to 0.2 ppm.

Soak Dosage:

- **ALTRET** representative guide you exact recommendation of **ALTRET 2532**
- Generally 0.5 to 1 ppm residue ClO₂ recommended looking to severity of algae and biomass.

Cooling tower Treatment with ALTRET 2532:

ALTRET 2532 is highly effective for cooling tower application

Used to control microorganism or biofilm intermittent

Directly apply at the suction of pump of cooling tower.

It can be dose directly in to the sump near to the suction of the cooling tower.

For regular dosage it can be dose to maintain residual level

Conclusion

ALTRET 2532 is safe and easy to use two component method for generating ClO_2

Effective against all water related microorganisms

It can rapidly diffuse and control the microbiological activity

Unchanged even after changing condition of cooling tower

The smell, taste and colour of drinking water improves

Ideal for small to medium use applications where the control of microbiological activity is essential

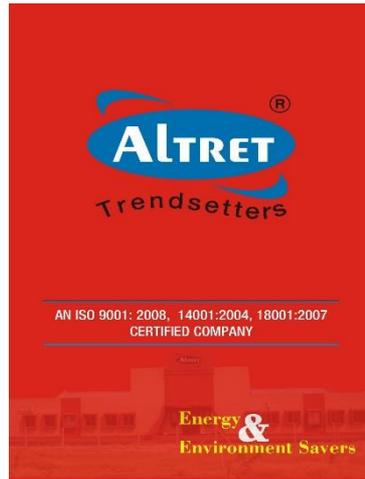
Other Product Ranges

**Water treatment
chemicals for
Boilers
& Cooling tower**

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Solutions**

**Combustion
Monitoring
Chemicals- Solid
& Liquid Fuels
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Desalination &
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**Corrosion Inhibitors,
Biocides, Scale
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