

## Comparison of Greenex™ CSD & Other Cooling water Treatments

	<b>GREENEX™ CSD Cooling System Detox</b>	<b>CHEMICAL ADDITIVE</b>	<b>MAGNETIC/ ELECTROSTATIC</b>	<b>OZONE GENERATOR</b>
Mode of Functions	<ul style="list-style-type: none"> <li>Utilizes plant based alkylpolyglycoside and organic chelating agent to control crystal growth of +/- ions (Calcium, Carbonate, etc.) Corrosion inhibitor protects metal from corrosion and algaecide kills and disperses dead slime and bio-mass formation inside „in-fills“</li> </ul>	<ul style="list-style-type: none"> <li>Standard phosphate based treatment as corrosion inhibitor with dispersant/biocide for sludge and algae control</li> </ul>	<ul style="list-style-type: none"> <li>Magnetic method decreases the surface tension of cooling water by 10 – 12%</li> <li>Electrostatic method attracts the deposited scale</li> </ul>	<ul style="list-style-type: none"> <li>Does not work on scale deposit</li> <li>Mainly use as biocide to control algae in the system</li> </ul>
Required installation	<ul style="list-style-type: none"> <li>None</li> <li>Product may be added manually into make up water or directly into the cooling tower basin</li> </ul>	<ul style="list-style-type: none"> <li>May require automatic feeding pump</li> </ul>	<ul style="list-style-type: none"> <li>Required a magnetic generator or electrostatic machine</li> <li>May require a separate water softener (applicable to hard water)</li> </ul>	<ul style="list-style-type: none"> <li>Require an ozone generator</li> <li>Require a cooling system for the ozone generator</li> <li>May require a separate water softener (applicable to hardwater)</li> </ul>
Additional requirement(s)	<ul style="list-style-type: none"> <li>Feeding once per week</li> <li>Not necessary to test water frequently</li> <li>Allows system to operate in a wider control parameters</li> <li>Encourages system to operate on much higher cycles of concentration</li> <li>Very much reduction in bleed-off, saving in water consumption</li> </ul>	<ul style="list-style-type: none"> <li>Electricity for the feeding pump</li> <li>Electricity for automatic bleed-off Valve</li> <li>Requires continuous feeding of chemicals Requires to maintain cooling water parameters by testing frequently Requires constant bleed-off to de-concentrate TDS &amp; Conductivity in system</li> </ul>	<ul style="list-style-type: none"> <li>Electricity for the magnetic/ electrostatic generator</li> <li>Sodium chloride and water to backwash softener (applicable to hard water)</li> </ul>	<ul style="list-style-type: none"> <li>Electricity for the generator</li> <li>Sodium chloride and water to backwash softener (applicable to hardwater)</li> </ul>
Directions/Precaution(s)	<ul style="list-style-type: none"> <li>Add product at suggested amount into the cooling water manually or with an automated feeder if already installed</li> <li>Very less bleed-off or blow-down is required as program allows system to run on much higher concentration</li> </ul>	<ul style="list-style-type: none"> <li>Requires continuous dosing using feeding pumps or with automatic feeder</li> <li>Extreme caution may be required when handling harsh chemicals. Operators must wear protective gears</li> </ul>	<ul style="list-style-type: none"> <li>Constant stream of electricity is required for the generator to run continuously</li> <li>Bleed off or blow down is required to keep the concentration level of dissolved solid</li> <li>In some cases, water filtration must be used</li> <li>Bleed-off or blow-down is required to keep the concentration level</li> </ul>	<ul style="list-style-type: none"> <li>Bleed off or blow down is required to keep the concentration level of dissolved solid</li> </ul>

## Common issue(s)

- After 2 months treatment, systems preferably should be shut down for a day to clear de-lodged scales, dead slime and biomass from basins
- Use high pressure water jet to clear remaining dead slime in in-fills

- **Scaling due to poor control of water chemistry; fouling and plucking of "in-fills" by slime and bio-mass could cause poor water distribution and cooling**

- Not known

- May cause corrosion

## Environmental/Human issue(s)

- Not known
- Product is tested by a government agency to have a 91% biodegradability

- **May be hazardous to users**
- **Extra steps are needed to treat the water before disposal**
- **Most are hazardous to marine environment**

- Increases electricity usage

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## Overall effectiveness

- Removes old and new scales and inhibit metal from new formation and corrosion
- Also kills and dislodges dead slime and bio-mass from in-fills
- Effluent safe for discharge to waste treatment plants or directly into common drains

- **Many types of harsh chemicals may be needed to achieve effectiveness**

- Low effectiveness
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