

The SBC's of Water Treatment

- for Cooling Towers & Open-loop Systems

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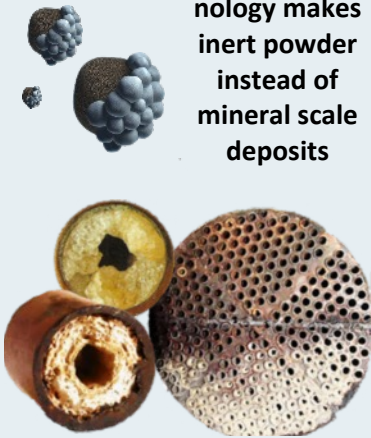
Hydro-ethical non-chemical device (NCD) technologies share the same treatment goals as conventional chemical-based methods; They prevent mineral Scale & deposition, control or prevent Bacteria growth, and deter Corrosion - fulfilling the "The SBC's" of water treatment.

NCD physical-treatment technologies perform equal-to and even superior to conventional technologies while avoiding the expensive and unethical traps of "chemical dependency" that pollute the downstream effluent and our natural environment. Cooling systems operate more cleanly and the nature of NCD operation deters efficiency losses and promotes water savings.

The following reviews the methods of Scale-, Bacteria-, and Corrosion-Control employed by NCD's and how Azure verifies their performance and compliance with industry standards.

Scale- Control

NCD technology makes inert powder instead of mineral scale deposits



As cooling systems evaporate water during heat-rejection, minerals and salts originating in the makeup water concentrate in the cooling system. Calcium, unlike other minerals and salts, precipitates in a hotter operating environment. Scale deposits reduce efficiency/ increase the energy required to provide cooling and, can promote under-deposit corrosion and harbor microorganisms.

Under physical-treatment, calcium precipitates with carbonates (think: "limestone powder") on suspended dirt particles making a harmless microscopic suspended powder that prevents scaling. Conventional chemical-treatment attempts to keep the calcium and carbonate in solution, a process dependent on the strength and concentration of the chemicals - but even this has limitations.

Both physical- and chemical-treatment require a conductivity/ water management controller that intentional waste a portion of the cooling water. The difference is that NCD technologies eliminate a primary risk-factor (rather than attempt to control it) and most physical treatment reduces overall water usage and waste.

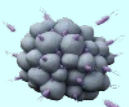
Azure's **Water Treatment Management Program (WTMP)** monitors the makeup & cooling system chemistry, calculates the volume of powder being generated, and applies industry standard "Scaling Indexes" to insure that cleanliness is maintained.

Biological- Control

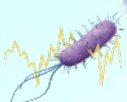
During physical treatment, bacteria suspended in the water stream can become encapsulated in the generated powder and the treatment signal itself can injure or limit reproduction (electroporation). Unlike treatment with poisonous chemicals, there are no harmful residuals left in the cooling and wasted blowdown water.

In three additional methods: nutrient-rich dirt particles are electrically-agglomerated limiting nutrient availability; consistent low bulk water populations causes bacterial biofilms on static surfaces to detach; and, the lack of chemical supplementing nutrients aren't an available food source.

Azure verifies acceptable bacteria counts each visit.



Illustrations of Encapsulation and Electroporation



Corrosion- Control

Unique to physical treatment technologies, natural calcium and carbonates in the makeup water become mono-layer thick corrosion inhibitors on metal surfaces much like traditional chemicals bond to surfaces in order to maintain passive protection - when the cooling system has attained "Saturation" or a powder generating state.

Since the bulk water has stabilized to a non-scaling mode, the mono-layer doesn't develop any larger. If this situation occurs in a chemically-treated system, the layer would have the potential to build into an energy or efficiency robbing scale.

Non-toxic additives can be added to newly filled systems to artificially attain saturation or aid in developing corrosion resistance.

Scaling Indexes, used for scaling-potential, double as tools to measure corrosion resistance.

Water & Energy Conservation, Environmental Impact Reduction through Technology & Expert Service