

HVAC Cooling Systems

Best Practices for Tower and Chiller End-of-Season Care



While control of water chemistry is vital to minimizing HVAC system corrosion and preventing deposit formation during the cooling season, additional factors begin to play a critical role during the shoulder season and winter months. Shoulder season temperatures often lead to infrequent system operation, followed by winter shutdown. Operational recommendations published by The Association of Water Technologies (AWT) stress the importance of maintaining circulation during these low-load periods as stagnant water can be damaging to cooling equipment and the associated piping network, regardless of treatment levels [1].

Prolonged stagnation poses the following risks:

- Conditions conducive to bacterial growth
- Settling of suspended particles on critical heat exchange surfaces
- Microbiologically induced corrosion on components including tube sheets, end bells, and piping

Recommended Standby Procedures

A proactive management plan used to limit cooling system stagnation will help to minimize and control these risks.

- **Short Term (0-3 days):** Run recirculating pumps for 1 hour, every 6 hours as recommended by the AWT [1].
- **Extended Shutdown (3+ days):** See shutdown and layup procedure below (complete drain/dry as advised by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) in Guideline 12). If dry shutdown is not possible, consult your Technical Representative and follow the recirculation guidelines above to help reduce the effects of stagnation.

[1] P. Sisk et al., "Guidelines for Treatment of Systems Containing Enhanced and Super-Enhanced Tubes", The Association of Water Technologies, www.awt.org/resources/technical_papers.cfm



Recommended System Shutdown and Layup Procedure

ASHRAE Guideline 12 recommends draining cooling towers and auxiliary equipment during extended shutdowns. Maintaining a clean and dry environment helps prevent localized corrosion, fouling, and bacterial growth. Many equipment providers also advocate dry layup [2,3]. Please consult your O&M manuals for additional information.

Step One: Disinfect

To best protect equipment from biological contaminants, disinfection helps remove microbial growth accumulated due to stagnation during the shoulder season.

1. Shut off cooling tower fans, keep circulation pumps running, and close all air intake vents within 30m of the cooling tower.
 2. Use the **DK-12000 Disinfection Kit** as instructed on product packaging to achieve the free residual chlorine (FRC) levels required for disinfection. Consult your representative for additional details.
- ✓ Please follow safety precautions for handling oxidizing chemicals – refer to MSDS.
 - ✓ High oxidizer levels will increase system corrosion rates and/or damage wooden parts. Inspection of susceptible components should be completed regularly on systems undergoing frequent disinfection.

Step Two: Dilute

Reducing the concentration of dissolved and suspended particles will help prevent excess deposit formation when the system is drained. Inhibitor can be added to facilitate solids removal prior to shut-down.

1. Lower tower cycles to 1-1.2 via manual or automated bleed.
2. Consult your representative regarding inhibitor addition.
3. Circulate system water for 48 hours.

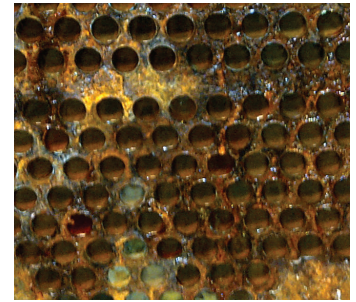
Step Three: Drain

A complete system drain will help prevent damage and freezing in the offseason.

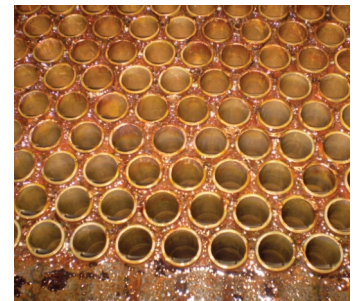
1. Drain the tower basin, sump, and piping as completely as possible.
2. Clean all wetted areas, including the basin, sump, fill, and spray nozzles.
3. Open the chiller condenser and brush tubes.
4. Fully dry and ventilate tube sheets, storing open with end bells removed.

[2] "Operation and Maintenance Instructions: For Evapco Induced Draft and Forced Draft Cooling Towers", Bulletin 113E, Evapco, 2014.

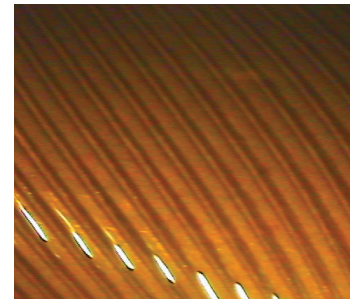
[3] "Operations and Maintenance: Centrifugal Liquid Chillers", Form 160.75-01 (211), York by Johnson Controls.



Fouled Tube Sheet



Clean Tube Sheet



Enhanced Tubes



Drained Cooling System

The purpose of this document is to provide guidelines for best practices for *Legionella* risk management. We makes no representation or warranty of the general concepts discussed herein as applied to a specific system. Please refer to the original OEM manuals for additional information. Any persons, corporation, or other entity making use of the general concepts discussed, shall indemnify AquaAnalytics for any claim, loss, or expense arising out of, or related to the information in this document.

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