

Cooling Tower Problems, Effects and Solutions

| | Tower (Media) | Chiller | Cold Basin | Hot Deck or Spray Bar System | Wastewater |
|------------------|--|---|--|---|--|
| Problems | <p>Fouling in media from: Scale Mud Biologicals Debris</p> <p>Broken or damaged media</p> <p>Lack of proper air flow, caused by facades that are too close, other physical blockages or incorrect fan speed.</p> | <p>GPM flow rate does not match the specifications of the tonnage of the chiller.</p> <p>Fouling from mud, biologicals or scaling.</p> <p>Strainers plugged.</p> | <p>Raised water level - media in water.</p> <p>Accumulation of mud and debris.</p> <p>Biological growth</p> <p>Corrosion</p> <p>Make-up problems.</p> <p>Float valve not functioning properly.</p> | <p>Scale, biologicals and corrosion.</p> <p>Debris</p> <p>Water distribution</p> | <p>Too high of a bleed off.</p> <p>Too low of a bleed off.</p> <p>Environmental concerns for biological program.</p> |
| Effects | <p>Scale, mud, biologicals and debris all impede distribution of water flow. Improper water flow causes changes in evaporation and Delta T, decreasing efficiency.</p> <p>Broken or damaged media can also impede water flow and reduce efficiency.</p> <p>When air flow is blocked in some manner, it limits the air volume or proper distribution of air through the media, changing water flow, evaporation, Delta T and limiting efficiency.</p> | <p>Low flow rates may mimic fouling of tubes. Lower flow rates may generate higher Delta T but may decrease the heat rejection by volume.</p> <p>Fouling causes poor heat transference and high approach temperatures, reducing energy efficiency.</p> <p>Plugged strainers lower flow rates and reduce efficiency.</p> | <p>Loss of performance caused by reduction of total media surface above water level.</p> <p>Decrease of water volume; increased TDS (total dissolved solids) and turbidity.</p> <p>Fouling, biomass and MIC (microbiologically influenced corrosion) formation.</p> <p>Costly repairs; contributes to MIC.</p> <p>Reduced water volume starves GPM for chiller operation.</p> <p>Water wasted through overflow at pump shutdown.</p> | <p>Blocked orifices/distribution nozzles.</p> <p>Overflow</p> <p>Interruption of proper flow reducing efficiency. Change in Delta T.</p> | <p>High bleed off leads to waste of water, increasing cost. Also requires more treatment products to be used in system.</p> <p>Low bleed off can often lead to improper water treatment balance.</p> <p>Environmental problems and restriction of discharge.</p> |
| Solutions | <p>For fouling in media a comprehensive water treatment program will address the biologicals with biocides; and scale, mud and silt through a proper combination of dispersants, bleed-off and in some cases filtration.</p> <p>Damaged media; consider replacement.</p> <p>Lack of proper air flow; check fan operation and speed, and distances of physical blockages that may be restricting air flow and make corrective adjustments where possible.</p> | <p>If VFD check for proper application, check for mechanical problems with pumps, consult engineering data for proper sizing.</p> <p>Isolate and chemically clean the chiller. Mechanically clean chiller tubes. Improve water chemistry to prevent future problems. Add filters.</p> <p>Clean strainers.</p> | <p>Lower water level; improve water make-up to prevent fluxation of pump supply.</p> <p>Improve biological program.</p> <p>Improve inhibitor program.</p> <p>Correct water volume supply.</p> <p>Regularly check for proper operation and balance makeup water with tower operation.</p> | <p>Improve biocide, descaling and corrosion inhibitor program to limit future issues.</p> <p>Manually remove debris that has entered hot deck from outside of the system (i.e. leaves, branches, birds)</p> <p>Correctly balance water distribution and make sure the tower is level.</p> | <p>Use higher cycles of concentration program.</p> <p>Develop a balanced program for the system utilizing biocides to find the optimized cycles of concentration.</p> <p>Use greener biocides that effectively control bacteria, algae and biomasses; but that biodegrade more readily in the system, eliminating concerns with discharge.</p> |