

Ammonia in Closed Loop Systems

– A technical update –

Introduction

Copper is an amphoteric metal and does not like high or low pH. Most heat exchangers are made out of copper. Also, most evaporator tubes, package units, air handlers, and distribution piping are copper. This becomes a sizable investment for most facilities, and sustainability can become an issue if the correct steps are not taken to protect it. Do not expect, if you do not inspect.

Ammonia testing is generally overlooked, though it is a key warning parameter.

How is Ammonia Formed in a Closed Loop?

Over 78% of our atmosphere is nitrogen. As a result, many bacteria use the nitrification process as part of their metabolism. The nitrosifiers also secrete ammonia, which has a high pH and is not a good addition to copper.

Over 90% of piping failures in cooling systems will be attributed to biologically induced under-deposit corrosion conditions.

Recommendations

Homeyer Consulting Services has developed standards and reaction protocols for ammonia levels in closed loop systems. Testing and trending of the ammonia levels is an easy indicator of what may be hiding. Elevated ammonia levels indicate the need to test for the strains of bacteria that secrete ammonia.

Take a look at your last service report from the treatment supplier to see if they are addressing the items related to copper protection and copper corrosion.

To evaluate the ammonia threat:

- Conduct periodic audits (including ammonia and biological testing) by an independent water consulting laboratory specializing in treated water, and challenge your water treatment firm to pay more attention to your closed loop systems.
- If the ammonia levels are above 2.0 PPM, there is an early indication that your copper is at risk.
- Anaerobic bacteria counts above 50 cells/ml, copper levels above 0.5 PPM, or copper corrosion rates above 0.1 mils/yr are also bad indicators for copper.

