The Importance of Flushing Glycol from HVAC Coils

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Closed Systems

Improper Flushing of Glycol from HVAC Coils
In cold climates, glycol is commonly added to HVAC coils prior to winter shutdown to prevent freeze damage. If the glycol is not properly flushed from the coils prior to starting the system back up, severe corrosion and microbiological fouling problems can occur throughout the system. Over time, water contaminated with low levels of glycol will typically begin to smell bad, have a low pH, and exhibit an orange to black color due to the presence of iron oxide corrosion by-products. Once these problems develop, they can be difficult to stop.

Problem-Causing Low Levels of Glycol
If the glycol used to protect HVAC coils from freezing is not completely removed prior to start-up, it will become part of the total system fluid once fully mixed, usually at a low concentration. At very low concentrations (<1%), glycol is an excellent food source for bacteria that can cause microbiological deposits and break down the glycol into corrosive organic acids. The organic acids in turn can cause the pH of the system water to rapidly drop and dissolve both pre-existing corrosion by-products and virgin metal. It is these organic acids that give a glycol-contaminated system a distinctive “rancid butter” odor.

Dilute glycol solutions are also more susceptible to decomposition by reaction with water (hydrolysis), especially in heated systems. The net effect of glycol degradation by hydrolysis or bacteria is the same: low pH, corrosion, and a bad odor.

Addressing Problems Caused by Glycol Contamination
The best solution to this problem is ensuring the glycol is thoroughly flushed from the HVAC coils prior to bringing them on-line. If a foul smell, a pH drop, or a change in the clarity or color of the system water is detected, low level glycol contamination is likely. The addition of biocide(s) and a bio-dispersant, as well as heavy flushing, are the main treatment measures. Flushing is required both before and after biocide addition to help remove the dead biomass and any remaining glycol before they become a food source for a second generation of bacteria. Frequent biocide dosages may be necessary to keep microbiological growth under control.

Depending on the severity of contamination, it may also be desirable to clean and passivate the closed system. After the system has been cleaned, a molybdate-based corrosion inhibitor product is preferred. Other types of inhibitors (nitrite or organic) should not be used as they can be a food source for any remaining bacteria.