Magnetic Separation in Commercial Hydronic Systems
May 21, 2015
with Mark Olson, GM
Q&A Documentation

Question:
Will the combo dirt/mag separator act as a remedial device for a system that already has a buildup of magnetite and minerals?

Answer:
No, when the magnetite has already started the process of "caking up", flushing or some other physical removal is needed to remove it. The objective for the designer/installer is to capture the magnetite soon after it forms and begins floating through the system, before it can cake.

Question:
By adding chemicals would you not increase the conductivity of the fluid which can be a problem?

Answer:
The problem here, I assume, is galvanic corrosion. Yes, adding chemicals can increase fluid conductivity and thus help create the condition for galvanic attack to occur if dissimilar metals are in contact with one another. For this reason we like demineralized water to be used, which has very low conductivity... depending on grade. Initially after filling, sometimes the pH can become slightly acidic, but over a brief time the pH self-neutralizes. Strangely, how this happens is still not completely understood. Then, if the pH has to be slightly tweaked, it can be accomplished with minimal chemicals added.

Question:
What is your opinion in using deionized water and sacrificial anodes in a closed loop system?

Answer:
The answer to demineralized water (i.e. deionized water) is above. Concerning sacrificial anodes, we see nothing wrong with using them in a hydronic system, other than to realize that the sacrificed metal will replace itself onto another metal more noble. What that could be in a sealed system has probably got a bunch of "ifs" associated with the question.

Question:
We recently experienced a tremendous amount of reddish silt (assuming hematite) in a brand new system. What would be the most likely cause of this?
**Answer:**
I think this was asked, but worth expounding on. Having hematite form so quickly in a system seems on the surface unlikely. However, if there is a large amount of oxygen getting into the system or if the air separator is not working correctly, it doesn’t take long for ferrous oxidation to occur... and it could likely have that red color. I’d check the system for ingress or verify that the separator is working correctly.

**Question:**
*If you're familiar with the Dolphin product, how is your product different?*

**Answer:**
If the same product that you are referring to, our knowledge of the Dolphin product is that it is intended for open systems (for example, water towers) and it depends on very small floating particles to precipitate lime scale out onto rather than have scale form on a surface. If Dolphin makes a product for preventing oxidation in a closed system, we are not aware of it. In any event, we use permanent magnets to separate iron oxide that forms in a system. Their method is to induce an electromagnetic field of some type to change the chemical behavior of the particles in solution... in an open system. Air or dirt separators are not intended to be used in an open system.

**Question:**
*I am puzzled as to why they used non-oxygen barrier radiant tubing. Was it previously installed by others?*

**Answer:**
The tubing we showed was not known to be non-oxygen barrier. But, yes, a couple of the problematic retrofit installation photos were indeed originally installed by others.

**Question:**
*Does glycol create the same problem in the system or is it only water?*

**Answer:**
Glycol by itself does not protect against corrosion. However, many glycols now have additives that serve to prevent lime scale from coming out of solution as easily and/or impede ferrous oxide corrosion. But, they have their caveats like anything else. One method is to be sure to prevent the glycol from turning acidic. Check out our June webinar coming up on glycol for more details.

**Question:**
*Does Caleffi have Magnetic / Dirt / Air Separator units all in one?*

**Answer:**
Yes. We have brass air/dirt/mag combos. We also have flanged coming Q3. You’ll find both in our current 2015 catalog.

**Question:**
*Is all the black stuff I see when I purge a system magnetite?*
**Answer:**
Though magnetite is usually black, some of the black stuff you see in a bucket you have purged from a dirt separator can also be non-ferrous particles... even though they may sink to the bottom as well. Certain chemicals - when they come out of solution - can turn a dark color... but a magnet may not attract them. Fortunately the dirt separator can still eliminate them, unlike a typical strainer device.

**Question:**
*Who else makes a magnetic separator?*

**Answer:**
Here in North America, Fernox has been marketing residential sized ones... maybe light commercial as well. BoilerMag has recently begun offering one for commercial applications. Those two are English-based firms, I believe. Magnetite is a **BIG** problem in England.

**Question:**
*Where is the best location for a magnetic dirt separator in a heating system?*

**Answer:**
A magnetic dirt separator eliminates both ferrous and non-ferrous forms of debris. If your system contains a piece of equipment that you are most concerned getting clogged with non-ferrous debris, it is best to position the separator directly upstream from it. If only magnetite and/or hematite is the expected form of debris, there is more latitude in where to place the separator. It is still best to locate upstream of vulnerable equipment, but acceptable if located somewhere else that flow from all circuits travels through. You wouldn't, for instance, want to place it in a leg of a secondary circuit.

**Question:**
*What tradeoffs are there in using a combo air dirt sep?*

**Answer:**
I assume this refers - in comparison to – instead of alternatively using a separate air and dirt separator. Good question! Under similar test conditions, they perform equally. However, using separate components gives the designer flexibility that can maximize performance. For instance, an air separator placed on the downstream side of a boiler (where fluid temp is highest) and a dirt separator placed on upstream side of boiler (where debris can be captured before entering boiler). But, the cost for two components is higher than one, so the combo is popular because any small difference in performance is often not detectable in application.

**CALEFFI** – Creating innovative, superior performance products that help customers live comfortably and economically, while softening their impact on the environment.

# # #