

ELIMINATOR® filter drier

Why you need a filter drier in your system

Any system generating debris, water or acid is at risk of permanent failure. Its compressor windings may go to ground, the TXV can plug or a solenoid may become stuck in the open position. These are all recurring problems that a filter drier will help avoid.

Even with the best installation practices, there are traces of carbon, copper-oxide or other debris that may clog the refrigeration system. Filter driers are an often overlooked and under-appreciated component in a refrigeration or A/C system. Not only do filter driers prevent problems from occurring, they also serve to fix problems that may exist.

Filter driers have an all-important, dual function—to dry and to filter. The drying function serves as chemical protection and includes the adsorption of water and acids. Here the purpose is to prevent both the corrosion of metal surfaces and decomposition of oil and refrigerant. The filter function serves as physical protection, and includes retention of particles and any type of impurities.



Dirt forms when:

- Soldering without purging with an inert gas (nitrogen);
- Assembly without following industry standard techniques for cleanliness;
- Converting a system from a CFC or HCFC to an HFC refrigerant with polyolester or alkybenzene oils.

As a consequence of the polar construction of their molecules, POE oils, and to some extent HFC refrigerants, act as solvent with an intensive cleaning effect. This causes any dirt particles in the system to be stripped from where they are and to float freely in the system.

Water forms when:

- System assembly takes place without following standard industry techniques for ensuring a dry system;
- Refrigerant is charged in a system which hasn't been properly evacuated;

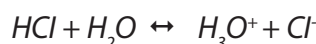
- Use of poor quality refrigerants;
- Use of poor quality oil;
- Any time the refrigeration system is opened there is an opportunity for moisture to enter through the ambient air.

Where acid comes from

Inorganic acids

Inorganic acids are typically formed in the discharge lines when running at high temperatures. However, these inorganic acids alone do not harm the system. The harm comes when

other acids are formed in the presence of water. This is called dissociation and is represented by the formula below.



The higher the water content in the system is, the more likely this dissociation will occur.

The "acid ion H_3O^+ " will react with the system metals to form metal chlorides.

E.g.



Organic acids

Mineral Oil

The formation of carboxylic acids from mineral oil is with a result of the oil being subjected to thermal or mechanical loads beyond its capacity in the presence of water and/or oxygen and/or

catalytic activity. The result is a broad spectrum of carboxylic acids, of which only a few have decidedly acidic properties (acetic acid, formic acid).

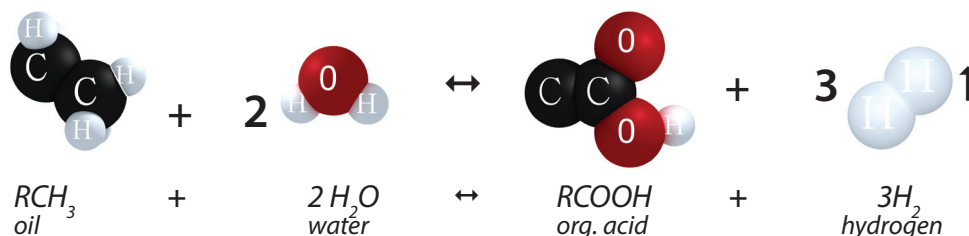


Fig. 1. Thermic, catalytic oil decomposition

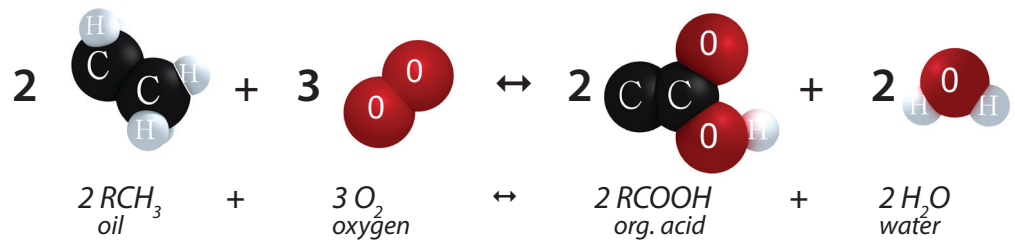


Fig. 2. Oxidation

POE oil

The large-molecule polyolester oil (POE) forms large-molecule carboxylic acids as a result of moisture being present (hydrolysis) within normal operating conditions for typical HVAC/R equipment. These various acids may or may not have acidic effects.

Since acids can be formed in systems using POE while operating within normal conditions, it is even more critical these systems stay dry so they are protected from unnecessary acid formation

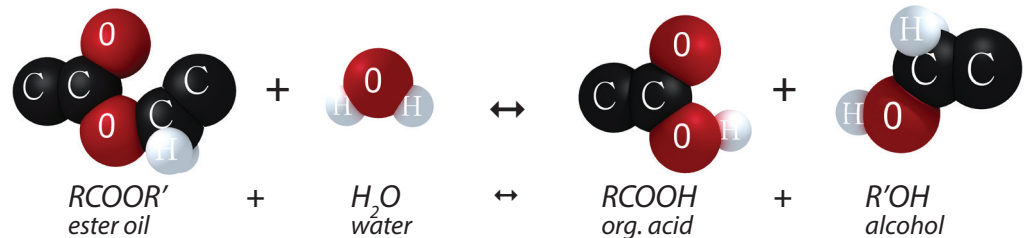


Fig. 3. POE Hydrolysis

What type of damage happens to your system without a filter drier

Drying function

Today there is a great deal of attention paid to keeping the components that make up the refrigeration system very dry during the entire assembly process. The primary concern is that the hydroscopic polyolester oils (POE) will absorb moisture from the air and react to form a corrosive environment in the system.

Previous concerns of ice formation in the expansion valve or capillary tube in a CFC systems are reduced. It is difficult for ice to form, since HFC refrigerants and POE oils are able to dissolve water to a degree that prohibits freezing from occurring.

However, moisture in the system allows for the formation of acid hydrogen, which is generated by extreme thermal (high temperatures) or mechanical (frictions, metal against metal) stresses.

Aggressive acids attack metal surfaces, which then begin to corrode. They also reduce the insulating properties of motor windings with risk of arcing and motor damage of hermetic or semi-hermetic compressors.

In addition to the increased risk of compressor damage, system efficiency may be impacted due to corrosion of the pipe surfaces.

All filter driers contain a molecular sieve to remove water. Many further contain activated alumina to remove acids. Since molecular sieves have strong attraction to water, they are able to pull water out of refrigerants. Acids are also polar molecules, but in a larger form. Activated alumina is designed to pull out these larger polar molecules.

What type of damage happens to your system without a filter drier**Filtering function**

As stated above, dirt comes from copper tubing, evaporators and condensers as a result of assembly and installation, and settles in the system. It further forms from operation as a consequence of the polar construction of molecules of POE oils and HFC refrigerants.

What's more, some dirt particles larger than 25 Microns may also damage or block components, such as valves, or especially dirt-sensitive applications like liquid injectors in the suction gas.

A filter drier helps prevent particles from finding their way into the compressor, risking damage to it and/or higher frequency of having the compressor serviced.

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