

Colin Pratt, technical director of Advanced Engineering explains how filter-driers work, and the extensive benefits they can deliver to a system's efficiency and reliability

# Filter tips: get the best from your drier

UNWELCOME dirt and moisture pose critical threats to the smooth operation of any acr system. Filter-drier units remove such contaminants from the refrigerant, protecting components from costly acid corrosion and unnecessary wear.

"While usually associated with larger air conditioning and refrigeration systems, it makes sound commercial sense to include them in small to medium sized applications too," says Colin Pratt, technical director of Advanced Engineering.

## Keeping it clean

Moisture and solid contaminants are persistent problems in acr maintenance.

"If a system has not been properly evacuated, if it leaks, or if the water-absorbing POE oils have been inadvertently exposed to the air, water molecules will have accumulated in your pipes," says Colin Pratt.

"Similarly, if a system has not been properly installed or serviced, brazing flux, dust, swarf, or insulation powder could all be trapped inside and circulated with the refrigerant."

In the short term all these elements can restrict the flow of refrigerants and make systems less efficient. In the longer term, however, their presence is a much more serious problem, as Colin Pratt points out.

"An acr system is like a big chemistry set. Refrigerants pass through components composed of various metals, while being regularly exposed to the catalysts of heat and pressure. The manufacturers of quality air conditioning and refrigeration products go to great lengths to ensure that the materials and substances used in their products will not react with other chemicals present."

Contaminants, however, are less discerning: "Nitrogen, oxygen and hydrogen from the air, along with the various elements of solid contaminants – when heated and compressed over many refrigeration cycles – react to create hydrofluoric and hydrochloric acids. These acids, if left unchecked, corrode components and create still more solid contaminants.

"Due to its small orifice, the TX valve is particularly susceptible to blockages caused by debris or moisture freezing as the refrigerant changes from liquid to

vapour. If the TX valve does get blocked, the system will shut down and require repairing."

## The science

At its most basic, the filter-drier unit consists of a water-absorbing core, inside a metal casing. The device catches solid detritus within the molecular sieve and extracts moisture from the refrigerant.

There are two basic types of unit. A liquid line filter-drier is installed between the condenser and evaporator, where the refrigerant is in a liquid state. The alternative suction line filter drier is, as the name implies, installed in the suction line.

"The water-absorbing cores of these devices are



composed of various 'desiccant' materials," explains Colin Pratt. "In layman's terms, these

materials have highly porous properties which cause them to absorb and retain liquids. However, modern desiccants are so sophisticated that they also act as molecular sieves. In order to prevent the absorption of refrigerant molecules, the desiccant is specially engineered to have holes shaped in such a way that they only trap water, acid molecules and debris.

"A standard filter will retain any particles bigger than 20 microns. To put that in perspective, that's less than one third the diameter of a human hair. Any particles small enough to pass through this do not present a danger to the system."

## Maintenance

Like a sponge, a desiccant can only hold so much moisture and, eventually, it will need replacing.

"At this point, as the filter-drier becomes less effective, some engineers might be tempted to use alcohol-based additives to remove unwanted moisture from

the system. This is not advisable. Such substances can actually cause the desiccant to absorb the alcohol, and deposit previously neutralised moisture and acid back into the system."

## Quality control

However, Colin Pratt is quick to point out that you really do get what you pay for.

"It's probably worth mentioning that, in the course of our research, we came across some units that simply weren't fit for purpose," he says.

"Yes, such products possess the key components (filters, desiccant, etc), but corners have clearly been cut, and both the quality and quantity of key components have suffered as a consequence.

"One Chinese-made product we looked at had countless design and manufacture faults. Not only did the unit contain a very low quantity of desiccant, but filters were not even sealed at the edges – allowing sizeable pieces of dangerous detritus to pass through gaps, unhindered.

"These budget products are simply not worth it. While they might reduce your initial outlay they could prove extremely expensive in the longer term – when things go wrong. How can you know whether a device is good or bad? Short of taking units apart and inspecting the quality of the components before you buy – a practice which your wholesaler might frown upon – my advice would be to put your faith in a manufacturer and supplier you can trust."

Needless to say Colin Pratt maintains that Advanced Engineering's Dry All filter-driers are designed and manufactured to very high standards

"We also pride ourselves on our high levels of ongoing customer support. Technical data sheets and instruction manuals for all our products are freely available on our website, and our team of specialists are a phone call away.

## Dry another day

While it's no replacement for thorough servicing, according to Advanced Engineering, a good quality filter-drier will, undoubtedly improve the operational efficiency of any acr unit, saving energy costs significantly and dramatically reducing the risk of expensive system failures.

[www.advancedengineering.co.uk](http://www.advancedengineering.co.uk)