Filter Driers

Function

As the name suggests, filter driers have two primary functions – filtering particles and ensuring that the system is free of moisture.

Particles in HVACR systems can clog or otherwise damage the system. To prevent this, filter driers use a woven filter screen to filter out particulate. As particles are trapped in the filter, the filtration increases, increasing the pressure drop through the drier. Unchecked, this may lead to refrigerant flashing to vapor in the drier. This can be easily identified with a noticeably cold liquid line leading from the drier to the metering device.

Different manufacturers have different philosophies on the level of filtration needed for filter driers serving in different applications. Too small a filter can lead to premature clogging and too large a filter will permit dangerous contaminants to pass through. For general purpose applications, a 20–25 micron filter drier is recommended.

The drying portion of the filter drier's function is a bit more complex than its name would suggest. The reason that filter driers must include a drying function is that water in the system will react with the oil to form acids, which in turn can cause burnouts. To prevent water from reacting with oil to create acid, the drier will remove water from the system. Driers typically accomplish this through the use of a molecular sieve core. As water passes through the core, water molecules are adsorbed into the core, removing it from the system. The larger refrigerant and oil molecules continue through the system. On the chance that acid has formed, some driers include activated alumina to remove acid molecules as well.

Drier Types

The most common filter drier types follow.

- Liquid Line Driers – These driers are installed just ahead of the system metering device (TXV, piston or capillary tube). Some manufacturers recommend that these driers only include molecular sieve for moisture removal. On an OEM install, this make sense, but for field replacement, it is recommended that they also contain an acid removal component. They should be replaced any time the system is opened.
- Bi-flow Driers – These driers are also installed in the liquid line but feature a design that permits filtration and drying regardless of the direction of system flow. They are intended for use in reversible heat pump systems. They typically have the same core makeup as a liquid line drier and should also be replaced any time the system is opened.
- Suction Line Driers – These driers are typically only used after a burnout. They contain a desiccant mixture that includes both moisture and acid removal properties to ensure that they can clean up the system after a burnout. They generally include two pressure taps on either side of the core to assess pressure drop. When using after a burnout, multiple replacements of the suction line drier may be necessary if the pressure drop is excessive.
- Hermetic vs. Replaceable Core Driers – For larger systems, manufacturers will use a design that permits the core of the drier to be removed. For most applications, hermetic driers are used. All cores available for hermetic driers are available for replaceable core driers.
- Copper Spun Driers – For smaller systems equipped with a capillary tube metering device, it is common to use copper spun driers. These driers do not use steel shells as do the options above, but rather have a copper shell. From a functional perspective, the drier typically utilizes a core of molecular sieve core and a filter pad as is the case with a standard liquid line filter drier.

Nomenclature

Like most line components, most driers utilize a common nomenclature for their core and connection sizes. Typically, you will see a model nomenclature that starts with three letters and ends with 3 numbers and potentially a final letter. The first few letters have a meaning unique to that manufacturer (for MARS, JLD = liquid line drier, JBF = bi-flow drier, and JSD = suction line drier). The first two numbers correlate to the drier size, the last number correlates to the connection size in 8ths of inches and the last letter indicates whether it is a sweat or flare connection (S = Sweat, Blank = Flare). Understanding this nomenclature can help in crossing from one manufacturer to another. An example for the JLD083S follows.

JLD	08	3	S
JARD liquid line drier. This is a meaning unique to the JARD line of driers.	8 cubic inch drier	3/8 connection size	Sweat connection

Best Practices

- Whenever the system is opened, the filter drier should be replaced. This ensures that any contaminants that have entered the system will get caught in the drier and not lead to a system malfunction.
- When replacing a drier, cut it out. Applying heat to drier that has been installed in the system for some time will likely drive moisture out of the drier and back into the system.
- Use the correct filter drier and core combination for the task at hand. If replacing the filter drier on a heat pump, be sure to use a bi-flow drier. When replacing a drier in the field, we recommend using a blend of activated alumina and molecular sieve, due to its ability to adsorb water and acid. After a burnout, use a suction drier to help clean the system. Remember that multiple changes may be necessary.
- A liquid line drier should be installed not at the outdoor unit, but as close to the indoor coil as possible. This is to ensure that as much refrigerant as possible between the outdoor unit and coil are adequately filtered.