

■ Fact sheet

Coalescing filters: Factors determining fluid separation

The transport of liquids through fibre filter media is a highly complex process determined by a large number of factors. The filtration rate and performance is however primarily determined by the porosity and tortuosity of the filter materials, their surface properties, the amount of liquid transferred through the filter and the flow velocity.

Reduced filtration rate at high flow rates

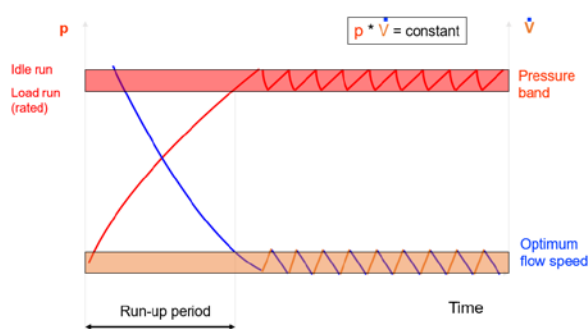
New filter elements are normally clean and dry. However, after a short time, moisture however begins to collect on the coalescing filter medium, gradually creeping in the direction of flow and wetting the drainage layer.

If the gravitational force is greater than the retention force of the filter, water drips from the wet layer into the condensate drain, and the filter medium becomes saturated with water.

In addition to water, dirt particles collect in the filter medium, forming deposits and narrowing the drainage channels so that the condensate can no longer drain off.

At peak flows, for example when a valve is opened suddenly, the liquid is pushed sidewise out of the drainage system, forming bubbles. When these bubbles burst, the resulting aerosol enters the system, thus affecting the compressed air application.

All this happens at the clean side of the filter. In such cases, the filter, which is installed to remove contaminants, actually becomes a source of contamination. As a result, there is an excess load on the downstream activated carbon filters or activated carbon adsorbers, reducing their service life. The contact time for effective adsorption is now too short so that contamination spreads through the entire compressed air system.



Recommendation

A minimum pressure valve that only opens when a certain minimum pressure is reached should be installed downstream of the compressed air treatment system. This eliminates the risk of excessively high flow velocities.

In many cases, fluid bubbles burst as a result of excessive contamination. That is why the German Mechanical Engineering Industry Association VDMA recommends changing fibre filter elements at least every 12 months (see VDMA Specification 15390, part 1).

For many applications, a much shorter interval should be chosen. It is for instance recommended to change a filter element the moment the differential pressure reaches 0.4 bar as replacing the element is cheaper than continuing running the system with a contaminated filter.