

### Conditions in a filter system

#### Air quantity in the filter

A filter is usually dimensioned to a certain gas or air quantity.

If a larger quantity of air is supplied to the filter, problems may arise such as: increased wear, increased pressure drop across the filter or even blocking of the air passage. The nature of the problems depend on the operating conditions. See page *Pressure Drop and Efficiency*.

It does not usually cause problems if the filter is supplied with less air than dimensioned; the pressure drop across the filter as well as wear and tear will be lower. With certain dusts, however, the reduced air velocity in the filter inlet may cause the dust to settle down and eventually block the inlet.

#### Air quantities in air technology systems

Just like the filter, the air technology systems, of which the filter forms part, are dimensioned for a certain air quantity. Often any variations in air quantity will cause similar problems here.

#### Dimensioning of fan or pump

The above conditions establish the fact that due to the nature of the filter the total pressure drop across a filter cannot be calculated. Therefore the dimensioning of a fan or a pump for a filter system is based on the maximum acceptable pressure drop across the filter. Consequently, if the air quantity is not adjusted, most filter systems operate at a larger air quantity on start-up and during most of the life time of a set of filter bags.

For centrifugal fans this is due to the fact that the operation point is dislocated along the fan curve to a larger air quantity where the pressure output equals the current one.

Many pump types operate at a more constant air quantity, however pumps dimensioned for large pressure outputs will produce a considerably larger air quantity when the system is unloaded. This is often seen in pneumatic conveying systems where long periods without effective work arise, e.g. in connection with product shift.

#### Adjustment of air quantity

In most cases an adjustment of the air quantity to roughly equal the dimensioned quantity is required. This adjustment may be carried out in two different ways:

Manual or automatic damper between filter and fan.

Speed adjustment of motor on pump or fan.

For centrifugal fans, the adjustment will always save energy. For most pumps, only speed adjustment will save energy.

A simple technique to estimate the air quantity manually is described on page *Recording of Filter Operating Data*. This is suitable as the basis of a manual adjustment.

A regular gauging of air quantities is of course always eligible, but rather more complicated. See page *Air Quantity Gauging*.

An automatic adjustment, of which the only purpose is to keep the air quantity at a constant level, may usually be based merely on a gauging of pressure in the duct before the filter. ■