Element Media Selection Considerations

The Right Media for the Right Application = Job Matched Filtration

Filtration Application Guidelines

Selecting the proper Schroeder media for your application is easy if you follow these simple guidelines.

Step 1. Remember that the key to cost effective contamination control is to maintain the system's cleanliness at the tolerance level of the system's most sensitive component. So, the first step is to identify the most sensitive component.

Step 2. Determine the desired cleanliness level (ISO Code) for that component by referring to Table 5 on page 15 or by contacting the component manufacturer directly.

Step 3. Referring to Table 8 identify the Schroeder filter medium that will meet or exceed the desired cleanliness level.

Step 4. Remember to regularly check the effectiveness of the selected media through the use of contamination monitoring equipment.

Table 8. Schroeder Element Media Recommendations

Desired Cleanliness Levels (ISO Code)	Schroeder Media
20/18/15-19/17/14	Z25
19/17/14-18/16/13	Z10
18/16/13-15/13/10	Z5
15/13/10-14/12/9	Z3
14/12/9-13/11/8	Z1

Effect of Ingression

Filter element life varies with the dirt holding capacity of the element and the amount of dirt introduced into the circuit. The rate of this ingression in combination with the desired cleanliness level should be considered when selecting the media to be used for a particular application. Table 9 provides recommendations accordingly.

The amount of dirt introduced can vary from day to day and hour to hour, generally making it difficult to predict when an element will become fully loaded. This is why we recommend specifying a Dirt Alarm®.

Schroeder-designed Dirt Alarms provide a vital measure of protection for your system by indicating when the filter element needs to be changed or cleaned. Schroeder filters are available with visual, electrical and electrical-visual combination Dirt Alarms. These indicators may also be purchased as separate items. For more information on Dirt Alarms, see Appendix A.

Table 9. Recommended Schroeder Media to Achieve Desired Cleanliness Levels Based on Ingression Level

Desired Cleanliness Levels (ISO Code)	Ingression Rate	Schroeder Element Medium
20/18/15	High	Z25
19/17/14	Low	Z25
19/17/14	High	Z10
18/16/13	Low	Z10
18/16/13	High	Z5
15/13/10	Low	Z5
18/16/13	High	Z3
15/13/10	Low	Z3
15/13/10	High	Z1
14/12/9	Low	Z1

Amount of Fluid Filtered

To obtain the desired cleanliness level (ISO Code) using the suggested Schroeder filter medium, it is recommended that a minimum of one-third of the total fluid volume in the system pass through the filter per minute. If fluid is filtered at a higher flow rate, better results may be achieved. If only a lesser flow rate can be filtered, a more efficient media will be required.

Systems operating in a clean environment, with efficient air-breather filters and effective cylinder rod wiper seals, may achieve the desired results at a lower turnover rate. Systems operating in a severe environment or under minimal maintenance conditions should have a higher turnover. Turnover must be considered when selecting the location of the system's filter(s).

Sizing a Filter Element

Since the pressure drop versus flow data contained in our filter catalog is for fluids with a viscosity of 150 SUS (32.0 cSt), and a specific gravity of .86, we are often asked how to size a filter with a viscosity other than 150 SUS (32.0 cSt) or a specific gravity other than .86. In those instances where the viscosity or specific gravity is significantly higher, it may be necessary to use a larger element. To make this determination, we need to calculate the life of the element, using the following equation:

$$EL = RC - (H + E)$$

Where:

EL = Element Life (expressed in psi)
RC = Relief valve cracking pressure
H = Housing pressure drop
E = Element pressure drop

1. The housing pressure drop can be read directly from the graph. This value is not affected by viscosity or the number of elements in the housing, since housing flow is turbulent.
2. The element pressure drop is directly proportional to viscosity, since element flow is laminar.

Schroeder's "rule of thumb" for element life, as calculated from the above equation, is to work towards a differential pressure drop that is no more than half (50%) of the bypass setting.

The interval between element changeouts can be extended by increasing the total filter element area. Many Schroeder filters can be furnished with one, two, or three elements or with larger elements. By selecting a filter with additional element area, the time between servicing can be extended for little additional cost.

Fluid Compatibility: Fire Resistant Fluids

Schroeder filters have been used successfully to filter a variety of fire resistant fluids for over five decades. Filtering these fluids requires careful attention to filter selection and application. Your fluid supplier should be the final source of information when using these fluids. The supplier should be consulted for recommendations regarding limits of operating conditions, material and seal compatibility, and other requirements peculiar to the fluid being used within the conditions specified by the fluid supplier.

High Water Content Fluids

High water content fluids consist primarily of two types: water and soluble mineral base oil, and water with soluble synthetic oil. The oil proportion is usually 5%, but may vary from as low as 2% to as high as 10%.

Standard Schroeder Z1, Z3, Z5, Z10, and Z25 elements are compatible with both types of high water content fluids. Filter sizing should be the same as with 150 SUS (32 cSt) mineral based hydraulic oil. Z1 and Z3 elements may be used; however, element changeouts will be more frequent. Some special factors that need to be considered in the selection process include the following:

- All aluminum in the filter housing should be anodized. This can be accomplished by using the "W" adder as shown in the filter model number selection chart.
- When using 95/5 fluids, check with fluid supplier for compatibility with aluminum.
- Buna N or Viton seals are recommended.
- The high specific gravity and low vapor pressure of these fluids create a potential for severe cavitation problems. Suction filters or strainers should not be used. The Schroeder Magnetic Separator (SKB), page 90, with its low pressure drop, is recommended for pump protection from ferrous or large particles.

Invert Emulsions

Invert emulsions consist of a mixture of petroleum based oil and water. Typical proportions are 60% oil to 40% water. Standard Schroeder filters with Z10 and Z25 media elements are satisfactory for use with these fluids. Filters should be sized conservatively for invert emulsions. These fluids are non-Newtonian—their viscosity is a function of shear. We recommend up to twice the normal element area be used as space and other conditions permit.

Fluid Compatibility: Fire Resistant Fluids (cont.)

Some special factors that need to be considered in the selection process include the following:

- Potential exists for cavitation problems with invert emulsions similar to high water based fluids. SKB suction separators are recommended for pump protection from ferrous or large particles.
- Buna N or Viton seals are recommended.

Water Glycols

Water glycols consist of a mixture of water, glycol, and various additives. Schroeder Z3, Z5, Z10 and Z25 elements are satisfactory for use with these fluids. Some special factors that need to be considered in the selection process include the following:

- All aluminum in the filter should be anodized. This can be accomplished by using the "W" adder as shown in the filter model number selection chart.
- Potential exists for cavitation problems with water glycols similar to high water based fluids. SKB suction separators are recommended for pump protection from ferrous or large particles.
- Buna N or Viton seals are recommended.

Phosphate Esters

Phosphate esters are classified as synthetic fluids. All Schroeder filters and elements can be used with most of these fluids. Sizing should be the same as with mineral based oils of similar viscosity. Some special factors that need to be considered in the selection process include the following:

- Use any Z media with EPR seals (H seal adder) for phosphate esters.
- Use Z3H.5, Z5H.5, Z10H.5 or Z25H.5 elements for Skydrol applications.

Pressure Drop Correction for Specific Gravity

Pressure drop curves shown in this catalog are predicated on the use of petroleum based fluid with a specific gravity of 0.860. The various fire resistant fluids discussed in this section have a specific gravity higher than 0.860, which affects pressure drop. Use the following formula to compute the correct pressure drop for the higher specific gravity:

$$\text{Corrected pressure drop} = \frac{\text{Fluid specific gravity}}{0.860} \times \text{Catalog pressure drop}$$