

## Filter elements for liquid filters

### Degree of filtration 2 µm up to 500 µm

Nominal size 5 up to 1800

Differential pressure resistant up to 210 bar (3045 psi)

#### 1. Features

##### High performance elements for nearly all fluids

- PS: new Filtration Group Premium Select high performance disposable filter elements with innovative design for hydraulic oils and lubricants, fuels, aqueous media and synthetic media
- Sm-N: disposable deep filtration elements with highest degree of filtration and dirt holding capacity
- Sm-x: standard disposable glass fibre filter elements for various applications
- Mic: inexpensive disposable filter elements
- Drg: cleanable surface filter element, made of wire mesh
- KS-Mic: high efficient disposable depth filter elements for cooling emulsions
- WS-Mic WS-PS and WS-Sm-x: Filter elements with additional water absorption ability
- Designed for Filtration Group filter housings, as alternative elements in the dimensions of other manufacturers and according to a customized specification
- Complete product range according DIN 24550
- Beta rated elements according to ISO 16889 multipass test
- Elements with high differential pressure stability and dirt holding capacity
- Worldwide distribution

## 2. Preface

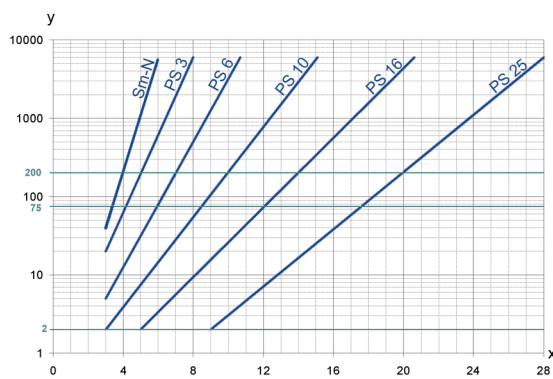
Filter elements are the virtual part of a filter through which the filtration process is realised. For the different liquids and applications Filtration Group developed different filter materials. Therefore a variety of elements are available which would fit into the same housing, but would suit different applications.

### 3.1 Filter material PS and Sm-N

Depth filters consisting of several layers of glass fibre (progressive design) to filter hydraulic oils and lubricants, flame resistant liquids, fuels and synthetic liquids.

- PS is available in ratings of 5 µm (c), 7 µm (c), 10 µm (c), 15 µm (c) and 20 µm (c) according to ISO 16889 (3µm, 6 µm, 10 µm, 16 µm and 25 µm according to ISO 4572) with a very high dirt holding capacity and simultaneous very low flow resistance.
- Sm-N 2 is available in ratings of 4 µm (c) according to ISO 16889 (2 µm according to ISO 4572) with an extremely high dirt holding capacity for very demanding requirements in regards to the filtration quality, for off-line filtration and for single-pass applications.

#### Separation grade characteristics



y = beta-value  
x = particle size [µm]

determined by multipass tests (ISO 16889)  
calibration according to ISO 11171 (NIST)

In a hydraulic or lubrication system a filter has the task to reduce the contamination to the accepted cleanliness level and to keep it for as long as possible. For the identification of solid particles in industrial hydraulics it is common practice to count particles according to ISO 4406. Subsequently the achievable cleanliness classes of the Sm-x and Sm-N. These values mirror our longtime experience in designing hydraulic filters and could be considered as guide values.

#### Filter performance data

tested according to ISO 16889 (multipass test)

PS/Sm-N elements with max.  $\Delta p$  10 bar

|      |    |                 |            |
|------|----|-----------------|------------|
| Sm-N | 2  | $\beta_{4(C)}$  | $\geq 200$ |
| PS   | 3  | $\beta_{5(C)}$  | $\geq 200$ |
| PS   | 6  | $\beta_{7(C)}$  | $\geq 200$ |
| PS   | 10 | $\beta_{10(C)}$ | $\geq 200$ |
| PS   | 16 | $\beta_{15(C)}$ | $\geq 200$ |
| PS   | 25 | $\beta_{20(C)}$ | $\geq 200$ |

values guaranteed up to 10 bar differential pressure.

#### Cleanliness classes

| Filter material | Cleanliness classes according to ISO 4406 (1999), > 4 µm(c)/ > 6 µm (c)/ >14 µm (c) |
|-----------------|-------------------------------------------------------------------------------------|
| Sm-N 2          | 13/11/08                                                                            |
| PS 3            | 14/12/09                                                                            |
| PS 6            | 16/13/10                                                                            |
| PS 10           | 17/15/11                                                                            |
| PS 16           | 20/17/12                                                                            |
| PS 25           | 23/19/13                                                                            |

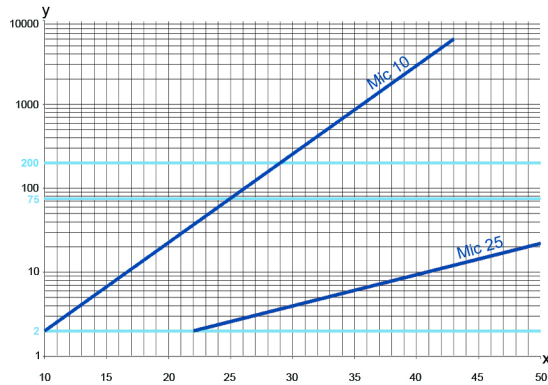
### 3.2 Filter material Sm-x

Deep filters with glasfibre filter material for all purposes. Filter performance, retention rates and the achievable cleanliness classes are fully corresponding to the new PS filter material.

### 3.3 Filter material Mic

Depth filters made of cellulose or glass fibre layers with a high dirt holding capacity and a low flow resistance. Degree of filtration 10 µm and 25 µm according to FGC norm. Use in hydraulic oil and lubricants filtration as suction filter as well as low cost filtration in plants with minor demands in regards to the filtrat quality.

#### Separation grade characteristics



y = beta-value  
x = particle size [µm]

#### Filter performance data

tested according to ISO 16889 (multipass test)

|     |    |              |          |
|-----|----|--------------|----------|
| Mic | 10 | $\beta_{10}$ | $\geq 2$ |
| Mic | 25 | $\beta_{25}$ | $\geq 2$ |

determined by multipass tests (ISO 16889)  
calibration according to ISO 11171 (NIST)

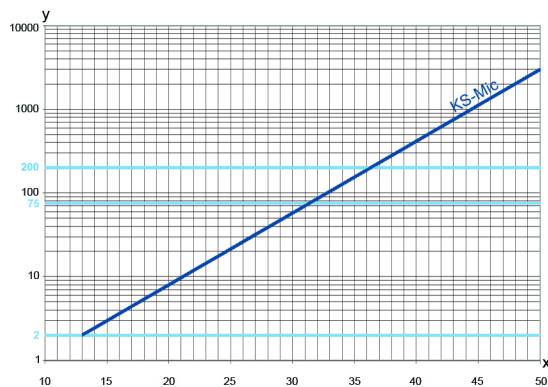
### 3.4 Filter material Drg

Surface filters made of stainless steel wire mesh with a very low flow resistance designed in the following weaves: plait, twill and linen. Degree of filtration 10 µm, 25 µm, 40 µm, 60 µm, 100 µm, 200 µm, 300 µm and 500 µm. For a wire mesh filter element the degree of filtration is determined by the largest diameter of a globular particle which would be able to pass the fabric. Wire mesh filter elements are used in hydraulic oil and lubricants filtration as suction or coarse filters, for high viscose fluids as well as safety filters for coolant filtration. Wire mesh elements possess a defined removal size as surface filter and a low dirt holding capacity as depth filter.

### 3.5 Filter material KS-Mic

Depth filter consisting of several, coordinated, binder-free polyester materials with a very high dirt holding capacity and low flow resistance. Degree of filtration: 25 µm according to FGC norm. Use as disposable filter in coolant filtration.

#### Separation grade characteristics



y = beta-value  
x = particle size [µm]

#### Filter performance data

tested according to ISO 16889 (multipass test)

|        |    |              |          |
|--------|----|--------------|----------|
| KS-Mic | 25 | $\beta_{25}$ | $\geq 5$ |
|--------|----|--------------|----------|

determined by multipass tests (ISO 16889)  
calibration according to ISO 11171 (NIST)

### 3.6 Filter materials WS-Mic, WS-Sm-x and WS-Sm-N

Filtration Group WS-elements for water removal are available as water absorber elements WS-Mic 25 with a low filter efficiency for particles or in combination with the highly efficient Sm-N 2 and Sm-x 10 configuration. A super absorber will change its chemical structure while absorbing water and indicates the amount of absorbed free water by an increase of flow resistance. The free water will be absorbed until the saturation limit is reached. WS-elements are applicable for all common lubrication and hydraulic fluids. The filter property complies with the corresponding Mic-, Sm-x- and Sm-N 2 element. The flow resistance of a water-free liquid would be insignificantly higher.

## 4. Quality assurance

Filtration Group filters and filter elements are produced according to the following international standards:

| Norm         | Designation                                                                                              |
|--------------|----------------------------------------------------------------------------------------------------------|
| DIN ISO 2941 | Hydraulic fluid power filter elements; verification of collapse/burst resistance                         |
| DIN ISO 2942 | Hydraulic fluid power filter elements; verification of fabrication integrity                             |
| DIN ISO 2943 | Hydraulic fluid power filter elements; verification of material compatibility with fluids                |
| DIN ISO 3723 | Hydraulic fluid power filter elements; method for end load test                                          |
| DIN ISO 3724 | Hydraulic fluid power filter elements; verification of flow fatigue characteristics                      |
| ISO 3968     | Hydraulic fluid power-filters-evaluation of pressure drop versus flow characteristics                    |
| ISO 10771.1  | Fatigue pressure testing of metal containing envelopes in hydraulic fluid applications                   |
| ISO 16889    | Hydraulic fluid power filters-multipass method for evaluation filtration performance of a filter element |

## 5. Technical specifications

Pleated filter elements

Flow direction from outside to inside

Corrosion protected, chrome VI free, end caps and support tube

Burst pressure resistance up to 210 bar

Filter material and filter area see table

Temperature range of application: -10 °C to +120 °C

Possible applications see description „Filter material“ chapter 3.1

Standard sealings for DIN elements: NBR, other sealing materials available on request

Elements with stainless steel parts available on request

## 6.1 Type number key and order numbers filter elements for in-line filters

### 6.1.1 Type number key filter elements for in-line filters

| Type |                                                 |                      |
|------|-------------------------------------------------|----------------------|
| Pi   | in-line filter                                  |                      |
|      | <b>Filter material and degree of filtration</b> |                      |
|      | 01                                              | Sm-N 2               |
|      | 10                                              | Mic 25               |
|      | 11                                              | Mic 10               |
|      | 21                                              | PS 3                 |
|      | 22                                              | PS vst 3             |
|      | 31                                              | PS 10                |
|      | 32                                              | PS vst 10            |
|      | 41                                              | PS 25                |
|      | 42                                              | PS vst 25            |
|      | 51                                              | PS 6                 |
|      | 52                                              | PS vst 6             |
|      | 81                                              | Drg 10               |
|      | 82                                              | Drg 25               |
|      | 83                                              | Drg 40               |
|      | 84                                              | Drg 60               |
|      | 85                                              | Drg 100              |
|      | 86                                              | Drg 200              |
|      | 87                                              | Drg 300              |
|      | 88                                              | Drg 500              |
|      | 89                                              | Drg special version  |
|      | 91                                              | Drg vst 10           |
|      | 92                                              | Drg vst 25           |
|      | 93                                              | Drg vst 40           |
|      | 94                                              | Drg vst 60           |
|      | 95                                              | Drg vst 100          |
|      | 96                                              | Drg vst 200          |
|      | 97                                              | Drg vst 300          |
|      | 98                                              | Drg vst 500          |
|      | 99                                              | metal edge           |
|      | <b>Nominal size</b>                             |                      |
|      | 05                                              | NG 50                |
|      | 08                                              | NG 80                |
|      | 11                                              | NG 110               |
|      | 15                                              | NG 150               |
|      | 30                                              | NG 300               |
|      | 45                                              | NG 450               |
| Pi   | 10                                              | 05 Selection example |

### 6.1.2 Filter elements\* for in-line filters

| Nominal size<br>NG [l/min] | Order number | Type                | Filter material | max. $\Delta p$<br>[bar] | Filter surface<br>[cm <sup>2</sup> ] |
|----------------------------|--------------|---------------------|-----------------|--------------------------|--------------------------------------|
| 50                         | 77576630     | Pi 1105 Mic 10      | Mic 10          | 20                       | 640                                  |
|                            | 77718620     | Pi 1005 Mic 25      | Mic 25          |                          | 640                                  |
|                            | 77680135     | Pi 2105 PS 3        | PS 3            |                          | 590                                  |
|                            | 77943509     | Pi 5105 PS 6        | PS 6            |                          | 590                                  |
|                            | 77680325     | Pi 3105 PS 10       | PS 10           |                          | 590                                  |
|                            | 77680440     | Pi 4105 PS 25       | PS 25           |                          | 590                                  |
|                            | 77680192     | Pi 2205 PS vst 3    | PS vst 3        | 210                      | 470                                  |
|                            | 77943533     | Pi 5205 PS vst 6    | PS vst 6        |                          | 470                                  |
|                            | 77680382     | Pi 3205 PS vst 10   | PS vst 10       |                          | 470                                  |
|                            | 77680507     | Pi 4205 PS vst 25   | PS vst 25       |                          | 470                                  |
|                            | 77680895     | Pi 8105 Drg 10      | Drg 10          | 20                       | 590                                  |
|                            | 77680911     | Pi 8205 Drg 25      | Drg 25          |                          | 590                                  |
|                            | 77680960     | Pi 8305 Drg 40      | Drg 40          |                          | 590                                  |
|                            | 77576648     | Pi 8405 Drg 60      | Drg 60          |                          | 365                                  |
|                            | 77681067     | Pi 8505 Drg 100     | Drg 100         |                          | 590                                  |
|                            | 77718687     | Pi 8605 Drg 200     | Drg 200         |                          | 365                                  |
|                            | 77718703     | Pi 8705 Drg 300     | Drg 300         |                          | 365                                  |
|                            | 77718695     | Pi 8805 Drg 500     | Drg 500         |                          | 590                                  |
|                            | 77689102     | Pi 9105 Drg vst 10  | Drg vst 10      | 210                      | 470                                  |
|                            | 77689128     | Pi 9205 Drg vst 25  | Drg vst 25      |                          | 470                                  |
|                            | 77689169     | Pi 9305 Drg vst 40  | Drg vst 40      |                          | 470                                  |
|                            | 77689219     | Pi 9405 Drg vst 60  | Drg vst 60      |                          | 470                                  |
|                            | 77689276     | Pi 9505 Drg vst 100 | Drg vst 100     |                          | 470                                  |
|                            | 77740921     | Pi 9605 Drg vst 200 | Drg vst 200     |                          | 470                                  |
|                            | 77740939     | Pi 9705 Drg vst 300 | Drg vst 300     |                          | 470                                  |
|                            | 77740947     | Pi 9805 Drg vst 500 | Drg vst 500     |                          | 470                                  |
|                            | on request   | on request          | KS-Mic25        | 20                       | -                                    |
|                            | on request   | on request          | Sm-N 2          |                          | -                                    |
| 80                         | 77680085     | Pi 1108 Mic 10      | Mic 10          | 20                       | 1250                                 |
|                            | 77657174     | Pi 1008 Mic 25      | Mic 25          |                          | 1250                                 |
|                            | 77680143     | Pi 2108 PS 3        | PS 3            |                          | 1150                                 |
|                            | 77943517     | Pi 5108 PS 6        | PS 6            |                          | 1150                                 |
|                            | 77680341     | Pi 3108 PS 10       | PS 10           |                          | 1150                                 |
|                            | 77680457     | Pi 4108 PS 25       | PS 25           |                          | 1150                                 |
|                            | 77680200     | Pi 2208 PS vst 3    | PS vst 3        | 210                      | 900                                  |
|                            | 77943541     | Pi 5208 PS vst 6    | PS vst 6        |                          | 900                                  |
|                            | 77681190     | Pi 3208 PS vst 10   | PS vst 10       |                          | 900                                  |
|                            | 77680515     | Pi 4208 PS vst 25   | PS vst 25       |                          | 900                                  |
|                            | 77718737     | Pi 8108 Drg 10      | Drg 10          | 20                       | 1150                                 |
|                            | 77680929     | Pi 8208 Drg 25      | Drg 25          |                          | 1150                                 |
|                            | 77680978     | Pi 8308 Drg 40      | Drg 40          |                          | 1150                                 |
|                            | 77681018     | Pi 8408 Drg 60      | Drg 60          |                          | 725                                  |

\* A wider range of element types is available on request.